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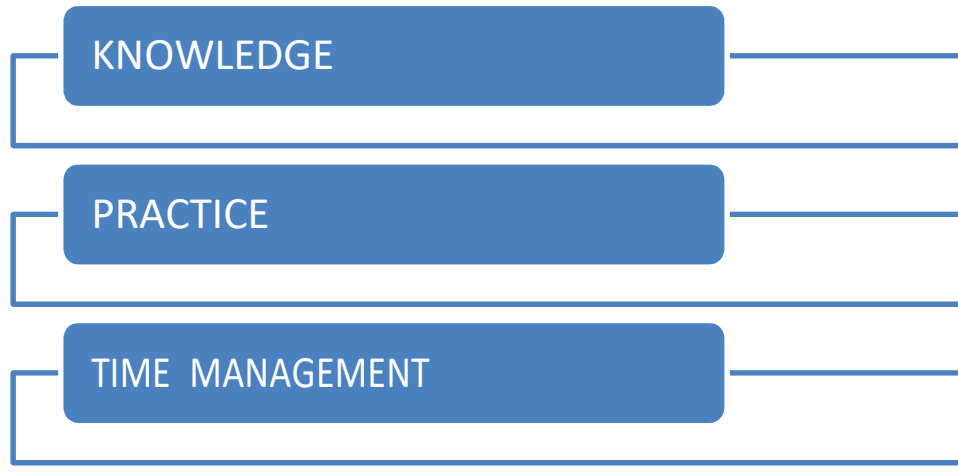
Teaching Experience: 09 Years



AIM AND OBJECTIVE OF PAPER

To develop knowledge and skills in the application of management accounting techniques to quantitative and qualitative information for planning, decision-making, performance evaluation and control.

HOW TO PASS



FORMAT OF PAPER

SECTION: A

- Contain 15 objective test (OTs) questions.
- Each question worth 2 marks (30 marks in total)

SECTION: B

- Contain 15 questions (MTQs)
- Each question worth 2 marks (30 marks in total)

SECTION: C

- Contain 2 Questions (Long Questions)
- Each question worth 20 marks (40 marks in total)

SYLLABUS

The syllabus is divided amongst four broad areas.

- 1) Specialist cost and management accounting techniques
- 2) Decision-making techniques
- 3) Budgeting and control
- 4) Performance management and control

PART A

SPECIALIST COST AND MANAGEMENT ACCOUNTING TECHNIQUES

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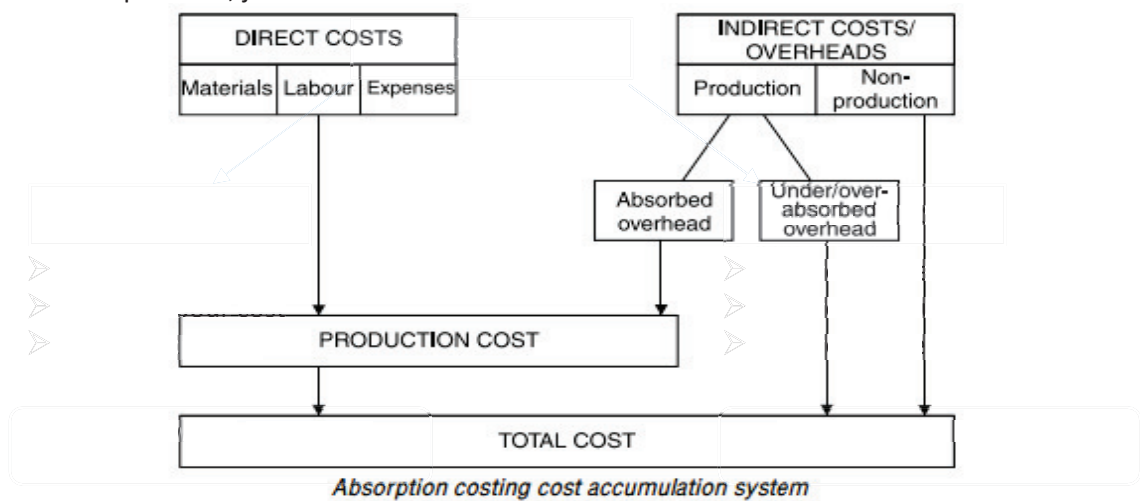
CHAPTER 1 COSTING

In this chapter, we will cover the following topics.

- 1) Costing
- 2) The problems of overheads
- 3) Revision of Absorption Costing
- 4) Overhead Absorption
- 5) Marginal Costing
- 6) Absorption Costing and Marginal Costing compared

1) COSTING

Costing is the process of determining the cost of products, services or activities. Cost accounting is used to determine the cost of products, jobs or services.



2) The Problems of Overheads

Indirect costs, or overheads, are costs incurred in making a product or providing a service, but which cannot be traced directly to products or services.

Absorption costing is a means of incorporating a fair share of these costs into the cost of each unit of product manufactured or each service provided.

If a company manufactures a product, the cost of the product will include the cost of the raw materials and components used in it and cost of the labour effort required to make it. These are **direct costs** of the product. The company would, however, incur many other costs in making the product which are not directly attributable to a single product, but which are incurred generally in the process of manufacturing a large number of product units. These are **indirect costs or overheads**. Such costs include the following

- Factory rent and rates
- Supervision costs
- Machine depreciation
- Heating and lighting

In a manufacturing organisation, production overheads are incurred in making the output, so each unit of product receives some benefit from these costs. Each unit of output should therefore be charged with some of the overhead costs.

3) Revision of Absorption Costing

Absorption costing is a method of product costing which aims to include in the total cost of a product (unit, job and so on) an appropriate share of an organisation's total overhead, which is generally taken to mean an amount which reflects the amount of time and effort that has gone into producing the product. In absorption costing, product cost includes both variable and fixed production cost.

Absorption costing is a traditional approach to dealing with overheads, involving three stages: allocation, apportionment and absorption of overhead into product cost (OHAR).

Allocation is the process by which whole cost items are charged directly to a cost unit or cost centre. **Direct costs** are allocated directly to cost units. **Overheads** clearly identifiable with cost centres are allocated to those cost centres but costs which cannot be identified with one particular cost centre are allocated to general overhead cost centres. The cost of a warehouse security guard would therefore be charged to the warehouse cost centre but heating and lighting costs would be charged to a general overhead cost centre.

The **first stage of overhead apportionment** involves sharing out (or apportioning) the overheads within **general overhead cost centres** between the other cost centres using a fair basis of apportionment (such as floor area occupied by each cost centre for heating and lighting costs).

The second stage of overhead apportionment is to apportion the costs of service cost centres (both directly allocated and apportioned costs) to production cost centres

After the apportionment of production overheads, all the overhead costs have been divided or shared between the production departments. The final stage in absorption costing is the **absorption** into product costs (using overhead absorption rates) of the overheads that have been allocated and apportioned to the production cost centres

An overhead absorption rate is calculated for each production department (or for production activity as a whole). Typically, this is an absorption rate per direct labour hour worked or an absorption rate per machine hour worked.

ABSORPTION COSTING INCOME STATEMENT

		\$
Sale (Sale units * sale price)		x
<u>Less Cost of Sale</u>		
Opening inventory (opening units * full production cost per unit)	x	
Production (production units * full production cost per unit)	x	
Less Closing inventory (closing units * full production cost per unit)	(x)	<u>(x)</u>
		x
Less under/add over absorbed overhead		<u>(x)/x</u>
Gross Profit		x
Less variable non production cost		(x)
Less fixed non production cost		<u>(x)</u>
Net Profit		x

4) Overhead Absorption

Overhead absorption means that, to include overhead in a cost of each unit or product.

After apportionment, overheads are **absorbed** into products using an appropriate **absorption rate** based on budgeted costs and budgeted activity levels.

Overhead costs are absorbed using a predetermined rate (**OHAR**) based on budgeted figures.

$$\text{OHAR} = \text{Budgeted Overhead} / \text{Budgeted Activity}$$

OVER AND UNDER ABSORPTION OF OVERHEAD

Under- or over-absorbed overhead occurs when overheads incurred do not equal overheads absorbed.

- Over-absorption means that the overheads charged to the cost of production or sales are greater than the overheads actually incurred.
- Under-absorption means that insufficient overheads have been included in the cost of production or sales.

Overhead absorbed	\$\$\$
Less: Actual overhead incurred	(\$\$)
	<hr/>
Over/(under) Absorbed overhead	\$/(\$)

$$\text{Overhead absorbed} = \text{OHAR} * \text{Actual Activity}$$

The reasons for under-/over-absorbed overhead

The overhead absorption rate is predetermined from budget estimates of overhead cost and activity level.

Under or over recovery of overhead will occur in the following circumstances.

- Actual overhead costs are different from budgeted overheads.
- The actual activity level is different from the budgeted activity level.
- Actual overhead costs **and** actual activity level differ from those budgeted.

5) Marginal Costing

In **marginal costing**, inventories are valued at variable production cost whereas in absorption costing they are valued at their full production cost. Profit is calculated by deducting variable costs of sales from sales revenue to obtain contribution, and then deducting fixed costs to obtain a figure for profit

Marginal cost is the cost of one unit of a product/service which could be avoided if that unit were not produced/provided.

Contribution is the difference between sales revenue and variable (marginal) cost of sales.

Marginal costing is an alternative to absorption costing. Only variable costs (marginal costs) are charged as a cost of sales. Fixed costs are treated as period costs and are charged in full against the profit of the period in which they are incurred

MARGINAL COSTING INCOME STATEMENT

		\$
Sale (Sale units * sale price)		x
<u>Less Cost of Sale</u>		
Opening inventory (opening units * variable production cost per unit)	x	
Production (production units * variable production cost per unit)	x	
Less Closing inventory (closing units * variable production cost per unit)	(x)	(x)
Gross Contribution		x

Less variable non production cost	(x)
Total Contribution	x
Less fixed production cost	(x)
Less fixed non production cost	(x)
Net Profit	x

6) Absorption and Marginal Costing Compared

The difference in profits reported under the two costing systems is due to the **different inventory** valuation methods used.

- If inventory levels increase between the beginning and end of a period, absorption costing will report the higher profit because some of the fixed production overhead incurred during the period will be carried forward in closing inventory (which reduces cost of sales) to be set against sales revenue in the following period, instead of being written off in full against profit in the period concerned.
- If inventory levels decrease, absorption costing will report the lower profit because as well as the fixed overhead incurred, fixed production overhead which had been carried forward in opening inventory is released and is also included in cost of sales

$$\text{MCP} = \text{ACP} + (\text{Opening units} - \text{Closing units}) * \text{Fixed OHAR}$$

MCP means Marginal Costing Profit

ACP means Absorption Costing Profit

CHAPTER 2 ACTIVITY BASED COSTING

In this chapter, we will cover the following topics.

1. Activity Based Costing
2. Absorption Costing Versus ABC
3. Merits and Criticisms of ABC

1) Activity Based Costing

Activity based costing ABC is a method for assigning costs to products, services, projects, tasks, or acquisitions, based on the activities that go into them and the resources consumed by these activities

Activity based costing (ABC) assigns manufacturing overhead costs to products in a more logical manner than the traditional approach of simply allocating costs on the basis of machine hours. Activity based costing first assigns costs to the activities that are the real cause of the overhead. It then assigns the cost of those activities only to the products that are actually demanding the activities.

The following terms are used in ABC costing.

Cost Pool. Cost pool is the total of overheads incurred in a cost centre.

Cost Driver. Cost driver is a factor that influences or contributes to the expense of certain business operations. In activity based costing (ABC), an activity cost driver is something that drives the cost of a particular activity.

A factory, for example, may have running machinery as an activity. The activity cost driver associated with running the machinery could be machine operating hours, which would drive the cost of labour maintenance and power consumption of running the machinery activity.

Steps involved in ABC costing.

Step 1 Identify organisation major activities that support the manufacture of organization's product or service. Such as machine setup, material handling, material ordering, production schedule, material despatching etc.

Step 2 Calculate **Cost pool** (total cost) of each activity identified in step 1.

Step 3 Identified suitable **cost driver** for each activity identified in step 1. E.g.

Cost pool	Cost drivers
Ordering cost: handling customer orders	Number of orders
Material handling costs	Number of production runs
Machine set-up costs	Numbers of machine set-ups
Machine operating costs	Number of machine hours
Production scheduling costs	Number of production runs
Despatching costs	Number of orders despatched

Step 4 Calculate cost per driver (OAR) for each activity identified in step 1.

Cost per driver = cost pool of each activity / total number of drivers of each activity

Step 5 Apportioned cost to each product on the basis of their usage of the activity (the number of drivers they used)

2) Absorption Costing versus ABC

- **For overhead allocation**, ABC establishes separate cost pools for support activities such as material handling. As the costs of these activities are assigned directly to products through cost driver rates, reapportionment of service department costs is avoided.
- **Overhead absorption** into products is where the main difference lies between ABC and traditional costing. Traditional absorption costing uses two absorption bases, (labour hours or machine hours) to charge overhead to products, whereas ABC uses many cost drivers as absorption bases (e.g. the number of orders, or the number of dispatches.)
- **The use of cost drivers** is the main idea behind ABC as they highlight what causes costs to increase for example, the number of orders to suppliers each product incurs. Overheads that do not vary with volume/output, but with some other activity, should be traced to products using ABC cost drivers. Traditional absorption costing, on the other hand, allows overheads to be related to products in more arbitrary ways therefore producing less accurate product costs.

Implementation Problems with ABC costing

- Lack of data
- Identifying cost drivers
- Lack of understanding

3) Merits and Criticism of ABC

ABC has a number of advantages

- It provides a more accurate cost per unit. As a result, pricing, sales strategy, performance management and decision making should be improved.
- It provides much better insight into what drives overhead costs.
- ABC recognizes that overhead costs are not all related to production and sales volume.
- In many businesses, overhead costs are a significant proportion of total costs, and management needs to understand the drivers of overhead costs in order to manage the business properly. Overhead costs can be controlled by managing cost drivers.
- It can be applied to derive realistic costs in a complex business environment.
- ABC can be applied to all overhead costs, not just production overheads.
- ABC can be used just as easily in service costing as in product costing

Criticism of ABC

- ABC will be of limited benefit if the overhead costs are primarily volume related or if the overhead is a small proportion of the overall cost.
- It is impossible to allocate all overhead costs to specific activities.
- The choice of both activities and cost drivers might be inappropriate.
- ABC can be more complex to explain to the stakeholders of the costing exercise.
- The benefits obtained from ABC might not justify the co

CHAPTER 3 TARGET COSTING

In this chapter, we will cover the following topics.

- 1) What is target costing?
- 2) Implementing target costing
- 3) Deriving a target cost
- 4) Closing a target cost gap
- 5) Target costing in service industry

1) What is Target Costing

Target costing involves setting a target cost for a product, having identified a target selling price and a required profit margin. The target cost is the target sales price minus the required profit.

Target costing involves setting a target cost by subtracting a desired profit from a competitive market price.

2) Implementing Target Costing

Steps involves in the implementation of the target costing process.

- Step 1) Determine a product specification of which an adequate sales volume is estimated.
- Step 2) Decide a target selling price at which the organization will be able to sell the product successfully and achieve a desired market share.
- Step 3) Estimate the required profit, based on required profit margin or return on investment.
- Step 4) Calculate: Target cost = Target selling price – Target profit.
- Step 5) Prepare an estimated cost for the product, based on the initial design specification and Current cost levels.
- Step 6) Calculate: Target cost gap = Estimated cost – Target cost.
- Step 7) Make efforts to close the gap. This is more likely to be successful if efforts are made to 'design out' costs prior to production, rather than to 'control out' costs after 'live' production has started.

Here are some of the decisions, made at the design stage, which can affect the cost of a product:

The features of the product

- how to avoid 'over design'
- the number of components needed
- whether the components are standard or specialized
- the complexity of machining and construction
- where the product can be made
- what to make in-house and what to sub-contract
- the quality of the product
- the batch size in which the product can be made

3) Deriving a Target Cost

The target cost is calculated by starting with a market-based target selling price and subtracting a desired profit margin.

Target Cost = Market Based Selling Price – Desired Profit Margin

4) Closing the Target Cost Gap

The target cost gap is the estimated cost less the target cost.

$$\text{Target cost gap} = \text{Estimated product cost} - \text{Target cost}$$

Various techniques can be employed to reduce the Target cost Gap.

- Reducing the number of components
- Using cheaper staff
- Using standard components wherever possible
- Acquiring new, more efficient technology
- Training staff in more efficient techniques
- Cutting out non-value-added activities
- Using different materials (identified using activity analysis etc)

5) Target costing in service industry

Target costing is difficult to use in service industries due to the characteristics and information requirements of service businesses. Unlike manufacturing companies, services are characterized by intangibility, variability, inseparability and no transfer of ownership.

Examples of service businesses include:

- (a) Mass service eg the banking sector, transportation (rail, air), mass entertainment
- (b) Either / or eg fast food, teaching, hotels and holidays, psychotherapy
- (c) Personal service eg pensions and financial advice, car maintenance

Some of the characteristics of services make it difficult to use target costing, and identify a target cost for a service having established a target selling price.

Services are much more difficult to specify exactly. This is due to some of the above characteristics of a service

CHAPTER 4 LIFE CYCLE COSTING

In this chapter, we will cover the following topics.

- 1) The product life cycle
- 2) Life cycle costs
- 3) Life cycle costing in manufacturing and service industries
- 4) Benefit of Life Cycle Costing

1) The product life cycle

The product life cycle can be divided into five phases

1. Development
2. Introduction
3. Growth
4. Maturity
5. Decline

1. DEVELOPMENT

The product has a research and development stage where costs are incurred but no revenue is generated. During this stage, a high level of setup costs will be incurred, including research and development, product design and building of production facilities.

2. INTRODUCTION

The product is introduced to the market. Potential customers will be unaware of the product or service, and the organisation may have to spend further on advertising to bring the product or service to the attention of the market.

Therefore, this stage will involve extensive marketing and promotion costs. High prices may be charged to recoup these high development costs.

3. GROWTH

The product gains a bigger market as demand builds up. Sales revenues increase and the product begins to make a profit. Marketing and promotion will continue through this stage.

Unit costs tend to fall as fixed costs are recovered over greater volumes. Competition also increases and the company may need to reduce prices to remain competitive

4. MATURITY

Eventually, the growth in demand for the product will slow down and it will enter a period of relative maturity.

It will continue to be profitable. However, price competition and product differentiation will start to erode profitability.

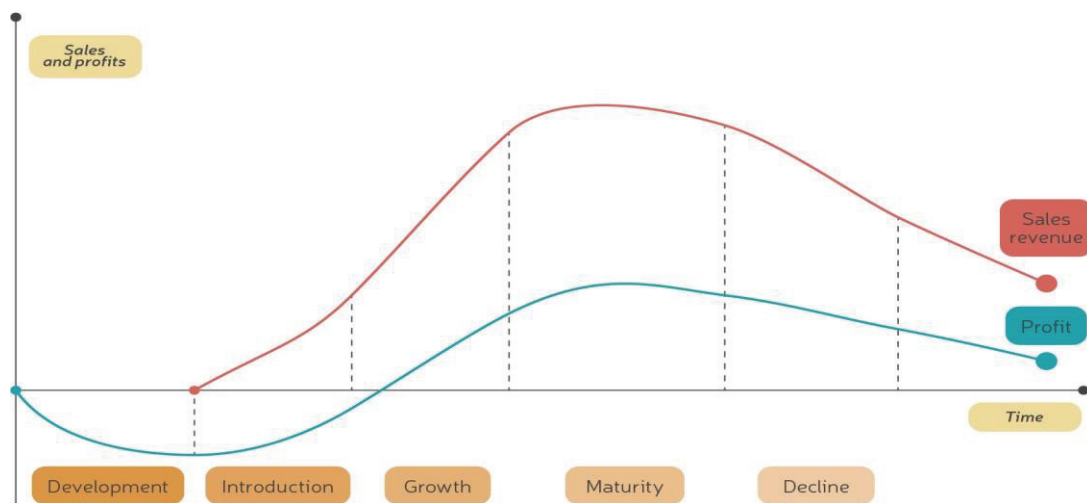
The product may be modified or improved, as a means of sustaining its demand

5. DECLINE

At some stage, the market will have bought enough of the product and it will therefore reach 'saturation point'.

Demand will start to fall and prices will also fall. Eventually it will become a loss maker and this is the time when the organisation should decide to stop selling the product or service.

During this stage, the costs involved would be environmental clean-up, disposal and decommissioning. Meanwhile, a replacement product will need to have been developed, incurring new levels of research and development and other setup costs.



2) Life cycle Costs

The life cycle costs of a product are all the costs attributable to the product over its entire life, from product concept and design to eventual withdrawal from the market.

The component elements of a product's cost over its life cycle could therefore include the following.

- Research & development costs
- Design costs
- Cost of making a prototype
- Testing costs
- Production process and equipment: development and investment
- The cost of purchasing **any technical data** required (for example purchasing the right from another organization to use a patent)
- Training costs (including initial operator training and skills updating)
- Production costs, when the product is eventually launched in the market
- Distribution costs. Transportation and handling costs
- Marketing and advertising costs
- Customer service
- Field maintenance
- Brand promotion
- Inventory costs (holding spare parts, warehousing and so on)
- Retirement and disposal costs. Costs occurring at the end of a product's life. These may include the costs of cleaning up a contaminated site

3) Life cycle Costing in Manufacturing And Service Industries

Both manufacturing and service organisations can use life cycle costing, to estimate returns over a product/service life cycle.

1. Maximizing return over the product life cycle

- Design costs out of products
- Minimise the time to market
- Minimise breakeven time
- Maximise the length of the life span

2. Service and project life cycles

- Services have life cycles. The only difference with the life cycle of a product is that the R & D stages will not usually exist in the same way.
- Products that take years to produce or come to fruition are usually called projects, and discounted cash flow calculations are invariably used to cost them over their life cycle in advance.

4) Benefit of Life cycle Costing

- 1) **All costs** (production and non-production) will be traced to individual products over their complete life cycles and hence individual product profitability can be more accurately measured.
- 2) The product life cycle costing results in **earlier** actions to generate revenue or to lower costs than otherwise might be considered.
- 3) **Better decisions** should follow from a more accurate and realistic assessment of revenues and costs, at least within a particular life cycle stage.
- 4) Product life cycle thinking can **promote long-term rewarding** in contrast to short-term profitability rewarding.
- 5) It helps management to **understand the cost consequences** of developing and making a product and to identify areas in which **cost reduction efforts** are likely to be most effective. Very often, 90% of the product's life-cycle costs are determined by decisions made in the development stage. Therefore, it is important to focus on these costs before the product enters the market.
- 6) Identifying the costs incurred during the different stages of a product's life cycle provides an insight into **understanding and managing the total costs incurred** throughout its life cycle. Non production costs will become more visible and the potential for their control is increased.

CHAPTER 5 THROUGHPUT ACCOUNTING

In this chapter, we will cover the following topics.

- 1) Theory of constraint
- 2) Throughput accounting
- 3) Performance measure in throughput accounting
- 4) Throughput accounting ratio

1) Theory of Constraint

The theory of constraints (TOC) is an approach to production management and optimising production performance, where its financial concept is to turn materials into sales as quickly as possible, thereby maximising the net cash generated from sales.

The theory of constraints also states that at any time there will always be a bottleneck resource or factor that sets a limit on the amount of throughput that is possible.

In the exam, the bottleneck resource is likely to be a production factor, such as machine time or labour time. You may be familiar with the concept of 'limiting factor' in production. A bottleneck resource is a limiting factor. In the theory of constraints and throughput accounting, a bottleneck resource is also known as the binding constraint.

2) Throughput Accounting

Throughput is the rate of converting raw materials and purchased components into products sold to customers.

Throughput accounting (TA) is an approach to production management which aims to maximise sales revenue less materials cost, whilst also reducing inventory and operational expenses.

In the short run, all costs in the factory (with the exception of materials costs) are **fixed costs**. These fixed costs include direct labour costs. It is useful to group all these costs together and call them **Total Factory Costs (TFC)**.

Main assumptions:

- The only totally variable cost in the short-term is the purchase cost of raw materials that are bought from external suppliers.
- Direct labour costs are not variable in the short-term. Many employees are salaried and even if paid at a rate per unit, are usually guaranteed a minimum weekly wage.
- Given these assumptions, throughput is effectively the same as contribution.

Example

Demand for a product made by P Ltd is 500 units per week. The product is made in three consecutive processes – A, B, and C. Process capacities are:

Process	A	B	C
Capacity per week	400	300	250

The long run benefit to P Ltd of increasing sales of its product is a present value of \$25,000 per additional unit sold per week. Investigations have revealed the following possibilities:

- 1) Invest in a new machine for process A, which will increase its capacity to 550 units per week. This will cost \$1m.
- 2) Replace the machine in process B with an upgraded machine, costing \$1.5m. This will double the capacity of process B.
- 3) Buy an additional machine for process C, costing \$2m. This will increase capacity in C by 300 units per week

Required:

What is P Ltd's best course of action?

3) Performance measure in Throughput Accounting

Performance measures in throughput accounting are based around the concept that the aim is to maximise throughput (**Sale revenue – material cost**). This is achieved by maximising the throughput per unit of bottleneck resource.

When an organisation makes more than one product, total throughput is maximised by giving priority to those products that earn the largest throughput per unit of bottleneck resource. Products should be ranked in order of priority according to their throughput per unit of bottleneck resource.

The top-ranking product should be manufactured up to the limit of maximum sales demand. The second-ranking product should be made next up to the limit of maximum sales demand, then the third, and so on.

The ratio for ranking products is therefore:

$$\text{Throughput return per factory hour} = \frac{\text{Sales} - \text{direct material costs}}{\text{Usage of bottleneck resource in hours (factory hours)}}$$

Example: Maximising throughput and multiple products

WR Co manufactures three products, A, B and C. Product details are as follows:

	Product A	Product B	Product C
Sale price	\$2.80	\$2.60	\$2.40
Material cost	\$1.20	\$1.60	\$1.20
Direct labour cost	\$1.00	\$0.80	\$0.80
Weekly sales demand	4,000 units	4,000 units	5,000 units
Machine hours per unit	0.5 hours	0.2 hours	0.3 hours

Machine time is a bottleneck resource and maximum capacity is 4,000 machine hours per week. Operating costs including direct labour costs are \$10,880 per week. Direct labour workers are not paid overtime and work a standard 38-hour week.

Required

Determine the optimum production plan for WR Co and calculate the weekly profit that would arise from the plan.

Solution

Step 1 Determine the bottleneck resource

The bottleneck resource is machine time (4,000 machine hours available each week).

Step 2 Calculate the throughput per unit for each product

	Product A	Product B	Product C
Sale price	\$2.80	\$2.60	\$2.40
Material cost	\$1.20	\$1.60	\$1.20
Throughput/unit	\$1.60	\$1.00	\$1.20

Step 3 Calculate throughput per unit of limiting factor (machine hours)

	Product A	Product B	Product C
Machine hours per unit	0.5 hours	0.2 hours	0.3 hours
Throughput per machine hour	\$3.20*	\$5.00	\$4.00

*\$1.60 / 0.5 hours = \$3.20

Step 4 Rank products

	Product A	Product B	Product C
	3rd	1st	2 nd

Step 5 Allocate resources to arrive at optimum production plan

The profit-maximising weekly output and sales volumes are as follows

Product	units	Bottleneck resource Hours/unit	Total Hours	Throughput hour	Total throughput
B	4,000	0.2 hours	800	\$5.00	\$4,000
C	5,000	0.3 hours	<u>1,500</u>	\$4.00	\$6,000
			2,300		
A (B.F)	3,400	0.5 hours	<u>1,700</u>	\$3.20	<u>\$5,440</u>
			4,000		\$15,440
			Less: operating expenses		\$10,880
			Profit Per Week		\$4,560

4) Throughput Accounting Ratio

Where there is a bottleneck resource (limiting factor), performance can be measured in terms of throughput for each unit of bottleneck resource consumed.

$$\text{Throughput accounting Ratio} = \frac{\text{Return per factory hour}}{\text{Cost per factory hour}}$$

- Return per factory hour = $\frac{\text{Throughput per unit}}{\text{Product's time on the bottleneck resource}}$
- Cost per factory hour = $\frac{\text{Total Factory Cost}}{\text{Total time available on bottleneck resource}}$

TPAR more than 1 would suggest that throughput exceeds operating costs so the product should make a profit. Priority should be given to the products generating the best ratios.

TPAR less than 1 would suggest that throughput is insufficient to cover operating costs, resulting in a loss.

Example: TA ratios and ranking products

C Company produces three products, X, Y and Z. The capacity of C's plant is restricted by process Alpha. Process Alpha is expected to be operational for eight hours per day and can produce 1,200 units of X per hour, 1,500 units of Y per hour, and 600 units of Z per hour.

Selling prices and material costs for each product are as follows

Product	selling price \$ per unit	material cost \$ per unit	Throughput \$ per unit
X	150	80	70
Y	130	40	90
Z	300	100	200

Operating costs are \$720,000 per day.

Required

- Calculate the profit per day if daily output achieved is 6,000 units of X, 4,500 units of Y and 1,200 units of Z.
- Calculate the TA ratio for each product.
- In the absence of demand restrictions for the three products, advise C's management on the optimal production plan.

Solution

- Profit per day = Throughput contribution – Operating costs

$$= [(\$70 \times 6,000) + (\$90 \times 4,500) + (\$200 \times 1,200)] - \$720,000$$

$$= \$345,000$$

- TA ratio = Throughput per factory hour / Operating costs per factory hour
 Operating costs per factory hour = $\$720,000 / 8 = \$90,000$

Product	Throughput per factory hour	Cost per factory hour	TA ratio
X	$\$70 \times 1,200 = \$84,000$	\$90,000	0.93
Y	$\$90 \times 1,500 = \$135,000$	\$90,000	1.50
Z	$\$200 \times 600 = \$120,000$	\$90,000	1.33

- If it is not possible to increase the number of factory hours available, priority should be given to making and selling Product Y, since it has the highest TA ratio. If only Product Y is made and sold (since there is no restriction on sales demand), total output per day would be $(1,500 \times 8 \text{ hours}) = 12,000$ units of Product Y. Total throughput would be \$1,080,000 ($= 12,000 \text{ units} \times \90) per day. Total profit per day would be $\$1,080,000 - \$720,000 = \$360,000$.
 This is \$15,000 more per day than the profit from the production mix in the answer to part (a).

CHAPTER 6 ENVIRONMENTAL ACCOUNTING

In this chapter, the following areas will be covered.

- 1) Managing environmental costs
- 2) Accounting for environmental costs

1) Managing Environmental Cost

Environmental accounting encompasses the provision of environment-related information both externally and internally.

Environmental management accounting is simply a specialised part of the management accounts that focuses on things such as the cost of energy and water and the disposal of waste and effluent. It is important to note at this point that the focus of environmental management accounting is not all on purely financial costs. It includes consideration of matters such as the costs vs benefits of buying from suppliers who are more environmentally aware, or the effect on the public image of the company from failure to comply with environmental regulations.

There are three main reasons why the management of environmental costs is becoming increasingly important in organisations.

- Society as a whole has become more environmentally aware, with people becoming increasingly aware about the 'carbon footprint' and recycling taking place now in many countries
- Environmental costs are becoming huge for some companies, particularly those operating in highly industrialised sectors such as oil production.
- Regulation is increasing worldwide at a rapid pace, with penalties for non-compliance also increasing accordingly.

2) Accounting for Environmental Cost

The United Nations Division for Sustainable Development (UNSD, 2003) identified management accounting techniques which are useful for the identification and allocation of environmental costs.

An effective system should be established to account for environmental costs. Key features include budgeting, forecasting, a clear structure of responsibilities as well as the establishment of an environmentally-friendly culture and performance appraisal process.

They are

- input/output analysis
- flow cost accounting
- environmental activity-based accounting
- life-cycle costing

There are four types of environmental cost.

- 1) **Conventional costs or traditional costs** such as raw material and energy costs, having an impact on the environment.
- 2) **Potentially hidden costs** are relevant costs that are account for within accounting systems but may be hidden within general overheads.
- 3) **Contingent costs** are costs that will be incurred at a future date as a result of discharging waste into the environment, such as clean-up costs.
- 4) **Image and relationship costs** are costs incurred to preserve the reputation of the business, for example, the costs of preparing environmental reports to ensure compliance with regulatory standards.

Typical environmental costs are listed below.

- Consumables and raw material
- Transport and travel
- Waste
- Waste and effluent disposal
- Waste consumption
- Energy

Internalised environmental costs

Internalised environmental costs are incurred within the organisation. They can be identified from the accounting records, can be quantified and valued in monetary terms and can often be traced to individual products and services, perhaps using an activity based costing system.

Two examples of internalised environmental costs are the cost of environmental certification and waste disposal costs.

Externalised environmental impacts

Externalised environmental impacts are the effects that the organisation's activities have on the external environment.

Two examples of externalised environmental impacts are carbon emissions and resource consumption

Practice question (16)

Environmental

A company is currently developing a system of environmental costing.

Required

- a) Describe the key features of an environmental management system. (5 marks)
 - b) Explain the difference between internalised environmental costs and externalised environmental impacts and state two examples of each. (5 marks)
- (10 marks)

PART B

DECISION MAKING TECHNIQUES

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CHAPTER 7 COST VOLUME PROFIT (CVP) ANALYSIS

In this chapter, the following topics will be recovered.

- 1) A recap of basic CVP analysis
- 2) Breakeven Point and Margin of Safety
- 3) Contribution to Sale Ratio (C/S) in Single & Multiple Product
- 4) Target profit or revenue in single and multi-product situations
- 5) Discuss the limitations of CVP analysis for planning and decision making

1) A Recap of Basic CVP Analysis

Cost volume profit (CVP)/breakeven analysis is the study of the interrelationships between costs, volume and profit at various levels of activity.

CVP Analysis is used to determine how changes in costs and volume affect a company's profit.

In performing this analysis, there are several assumptions made, including:

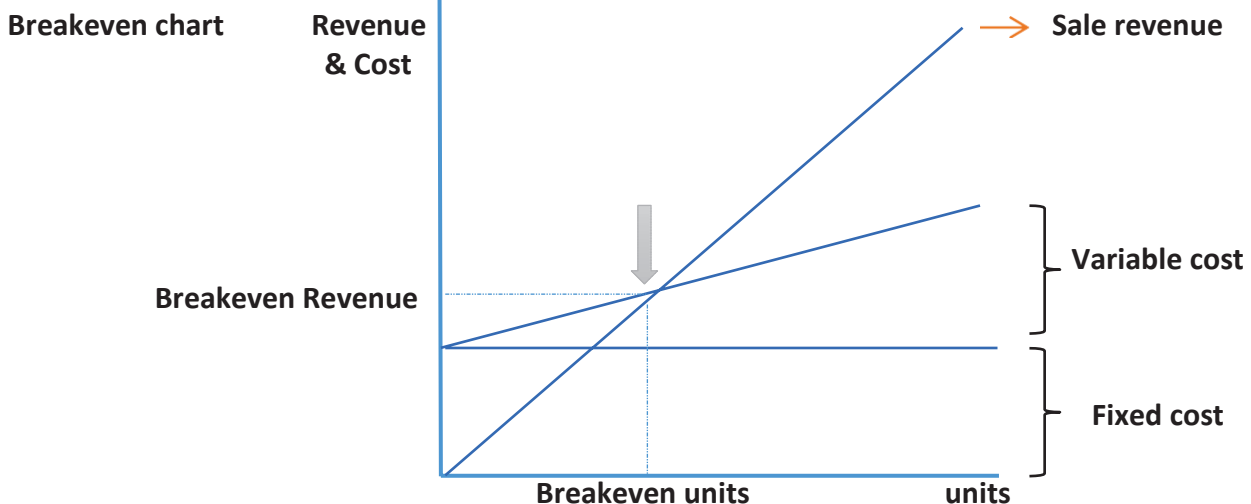
- Sales price per unit is constant.
- Variable costs per unit are constant.
- Total fixed costs are constant.
- Everything produced is sold.
- Costs are only affected because activity changes.

2) Breakeven Point

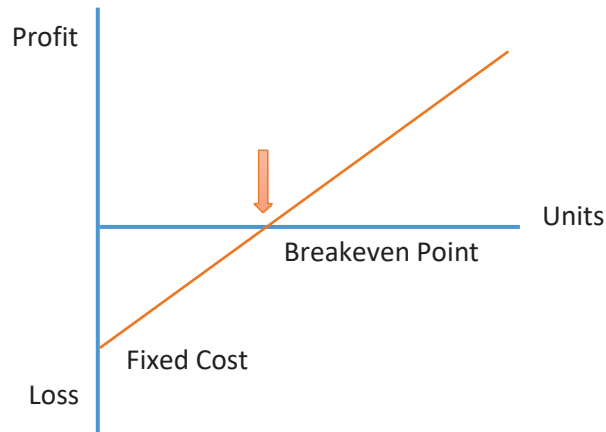
The break-even point is the point at which total cost and total revenue are equal: there is no net loss or gain. Breakeven point is the level of sales at which there is neither profit nor loss.

Breakeven point in units = Fixed Cost / Contribution per unit

Breakeven point in revenue = Fixed Cost / CS ratio



A break-even chart shows the costs and revenues at a number of activity levels. It does not however, show the amount of profit or loss at these levels. This is shown on the profit/volume chart.



Drawing a Basic Breakeven Chart

A basic breakeven chart records costs and revenues on the vertical axis (y) and the level of activity on the horizontal axis (x). Lines are drawn on the chart to represent costs and sales revenue.

The breakeven point can be read off where the total sales revenue line cuts the total cost line. We will use a basic example to demonstrate how to draw a breakeven chart. The data is:

Selling price	\$50 per unit
Variable cost	\$30 per unit
Fixed costs	\$20,000 per month
Forecast sales	1,700 units per month

Prepare basic breakeven chart.

3) Breakeven Point in Multiple Product

$$\text{Breakeven Point in Sale Units} = \frac{\text{Total Fixed Cost}}{\text{Weighted average contribution per unit}}$$

$$\text{Breakeven Point in Sale Revenue} = \frac{\text{Total Fixed Cost}}{\text{Weighted average C/S Ratio}}$$

Example

PL produces and sells two products, M and N. Product M sells for \$7 per unit and has a total variable cost of \$2.94 per unit, while Product N sells for \$15 per unit and has a total variable cost of \$4.40 per unit. The marketing department has estimated that for every five units of M sold, one unit of N will be sold. The organisation's fixed costs per period total \$123,600.

Required

Calculate the breakeven point for PL.

Solution

We calculate the breakeven point as follows.

Step 1 Calculate the contribution per unit and the weighted average contribution per unit.

	M	N	
Sale price	\$7	\$15	
Variable cost	\$2.94	\$4.40	
Contribution	\$4.06	\$10.60	
Contribution from sale of 5 units of M	5 * \$4.06		= \$20.30

Contribution from sale of 1 unit of N	(1*\$10.60)	=	\$10.60
Contribution from sale of 6 units in standard sales mix		=	\$30.90

Weighted average contribution per unit = $\$30.90/6 = \5.15 per unit.

Step 2 Calculate the breakeven point in units.

Fixed costs/Weighted average contribution per unit = $\$123,600/\$5.15 = 24,000$ units.

These are in the ratio 5:1; therefore breakeven is at the point where 20,000 units of M are sold (= $24,000 \times 5/6$) and 4,000 units of N are sold (= $24,000 \times 1/6$).

Step 3 Calculate the breakeven point in sales revenue.

	Contribution		Revenue	
	Per unit	Total	Per unit	Total
Product M (5 units)	\$4.06	\$20.30	\$7	\$35
Product N (1 unit)	\$10.60	\$10.60	\$15	\$15
		<u>\$30.90</u>		<u>\$50</u>

Weighted average C/S ratio = $\$30.90/\$50 = 61.8\%$ or 0.618

Step 4 Calculate breakeven points (total). = Fixed costs ÷ Weighted average C/S ratio

Fixed costs/Weighted average contribution per unit = $\$123,600/0.618 = \$200,000$ in sales revenue.

Step 5 Calculate breakeven sales for each product.

M = $\$200,000 \times (35/50) = \$140,000$

Sales price per unit = \$7

Therefore breakeven point in units = $\$140,000/\$7 = 20,000$ units.

N = $\$200,000 \times (15/50) = \$60,000$

Sales price per unit = \$15

Therefore breakeven point in units = $\$60,000/\$15 = 4,000$ units.

4) Margin of Safety

The margin of safety is the area between the break-even point and the maximum sales. This is the area that the company can operate in and be certain of making a profit. It is usually classed as the amount of sales that a company can afford to lose before it gets into a loss making situation.

It is usually expressed as a percentage (%) of sales.

It can be calculated as:

$$\text{Margin of safety} = \frac{\text{Maximum sales} - \text{break-even point sales}}{\text{Maximum sales}} \times 100\%$$

5) Margin of Safety for Multiple Products

The basic breakeven model for calculating the margin of safety can be adapted to multiproduct environments. Calculating the margin of safety for multiple products is exactly the same as for single products, but we use the standard mix. The easiest way to see how it's done is to look at an example below:

Example

Murray Ltd produces and sells two types of sports equipment items for children, balls (in batches) and miniature racquets. A batch of balls sells for \$8 and has a variable cost of \$5. Racquets sell for \$4 per unit and have a unit variable cost of \$2.60. For every 2 batches of balls sold, one racquet is sold. Murray budgeted fixed costs are \$407,000 per period. Budgeted sales revenue for next period is \$1,250,000 in the standard mix.

To calculate the margin of safety, the following steps must be followed:

Step 1 Calculate contribution per unit:

	Balls \$ per batch	Racquets \$ per unit
Selling price	\$8	\$4
Variable cost	\$5	\$2.60
Contribution	<u>\$3</u>	<u>\$1.40</u>

Step 2 Calculate contributions per mix:

$$(\$3 \times 2 \text{ batches}) + (\$1.40 \times 1 \text{ racquet}) = \$7.40$$

Step 3 Calculate the breakeven point in terms of the number of mixes:

$$\text{Breakeven point} = \text{Fixed costs} / \text{Contribution per mix}$$

$$\text{Breakeven point} = \$407,000 / \$7.40 = 55,000 \text{ mixes}$$

Step 4 Calculate the breakeven point in terms of the units of the products:

$$55,000 \text{ mixes} \times 2 = 110,000 \text{ balls}$$

$$55,000 \text{ mixes} \times 1 = 55,000 \text{ racquets}$$

Step 5 Calculate the breakeven point in terms of revenue

$$(\$8 \times 110,000 \text{ batches}) + (\$4 \times 55,000 \text{ racquets}) = \$1,100,000$$

Step 6 Calculate the margin of safety:

$$\text{Budgeted sales} - \text{breakeven sales} = \$1,250,000 - \$1,100,000 = \$150,000.$$

$$\text{Or, as a percentage, } (\$1,250,000 - \$1,100,000) / \$1,250,000 = 12\%$$

6) Target profit or revenue in single and multi-product situations

The approach is the same as in single product situations, but the weighted average contribution to Sales Ratio is now used so that:

$$\text{Sales to Achieve Target Profit} = \frac{\text{Fixed Cost} + \text{Required Profit}}{\text{Weighted Avg. C/S Ratio}}$$

$$\text{Sales Units to Achieve Target Profit} = \frac{\text{Fixed Cost} + \text{Required Profit}}{\text{Weighted Avg. Contribution/Unit}}$$

7) Limitation of CVP Analysis

The following underlying assumptions will limit the precision and reliability of a given cost volume profit analysis.

- 1) The behaviour of total cost and total revenue has been reliably determined and is linear over the relevant range.
- 2) All costs can be divided into fixed and variable elements.
- 3) Total fixed costs remain constant over the relevant volume range of the CVP analysis.
- 4) Total variable costs are directly proportional to volume over the relevant range.
- 5) Selling prices are to be unchanged.
- 6) Prices of the factors of production are to be unchanged (for example, material, prices, wage rates).
- 7) Efficiency and productivity are to be unchanged.
- 8) The analysis either covers a single product or assumes that a given sales mix will be maintained as total volume changes.
- 9) Revenue and costs are being compared on a single activity basis (for example, units produced and sold or sales value of production).

- 10) Perhaps the most basic assumption of all is that volume is the only relevant factor affecting cost. Of course, other factors also affect costs and sales. Ordinary cost volume profit analysis is a crude oversimplification when these factors are unjustifiably ignored.
- 11) The volume of production equals the volume of sales, or changes in beginning and ending inventory levels are insignificant in amount

CHAPTER 8 LIMITING FACTOR ANALYSIS

In this chapter, we will cover the following topics.

- 1) Identify limiting factors
- 2) Determine the optimal production plan
- 3) Explain and calculate shadow prices (dual prices)
- 4) Formulate and solve a multiple scarce resource
- 5) Calculate shadow price and slack and explain the implications

1) Limiting Factor

A limiting factor is any factor that is in scarce supply and that stops the organisation from expanding its activities. Limiting factors would include:

- Supply of skilled labour
- Supply of materials
- Factory space
- Finance

2) Optimal production Plan

The following steps involved in process of limiting factor of a single scarce resource.

- Step 1: identify the scarce resource.
- Step 2: calculate the contribution per unit for each product.
- Step 3: calculate the contribution per unit of the scarce resource for each product.
- Step 4: rank the products in order of the contribution per unit of the scarce resource.
- Step 5: allocate resources using this ranking and answer the question.

3) Linear Programming

When there is only one scarce resource the method above (key factor analysis) can be used to solve the problem. However, where there are two or more resources in short supply which limit the organisation's activities then linear programming is required to find the solution.

Linear programming is a technique that may be used to determine the contribution-maximising or cost-minimising solution to a problem when there are two (or more) limiting factors, not just one.

In examination questions linear programming is used to:

- maximise contribution and/or
- minimise costs

Formulating a linear programming problem involving two variables

The steps involved in linear programming are as follows:

Step 1: Define the variables

Step 2: Define and formulate the objective (maximum contribution)

Step 3: Formulate the constraints

Step 4: Draw a graph identifying the feasible region

Step 5: Solve for the optimal production plan

Step 6: Answer the question (maximum profit)

Example:

A company produces two products in three departments. Details are shown below regarding the time per unit required in each department, the available hours in each department and the contribution per unit of each product:

	Product R : hours per unit	Product S : hours per unit	Available hours
Department A	8	10	11,000
Department B	4	10	9,000
Department C	12	6	12,000
Contribution p.u.	\$4	\$8	

Required

Determine, using a step by step approach, what the optimum production plan is.

6) Shadow price

The shadow price or dual price of a limiting factor is the increase in value which would be created by having one additional unit of the limiting factor at its original cost.

- The shadow price of a resource can be found by calculating the increase in value (usually extra contribution) which would be created by having available one additional unit of a limiting resource at its original cost.

It therefore represents the maximum premium that the firm should be willing to pay for one extra unit of each constraint. This aspect is discussed in more detail below.

- Noncritical constraints will have zero shadow prices as slack exists already.

Calculating shadow prices

The simplest way to calculate shadow prices for a critical constraint is as follows:

Step 1: Take the equations of the straight lines that intersect at the optimal point. Add one unit to the constraint concerned, while leaving the other critical constraint unchanged.

Step 2: Use simultaneous equations to derive a new optimal solution

Step 3: Calculate the revised optimal contribution. The increase is the shadow price for the constraint under consideration.

CHAPTER 9 PRICING DECISION

In this chapter, the following topics will be covered.

- 1) Explain the factors that influence the pricing of a product or service.
- 2) Explain the price elasticity of demand.
- 3) Derive demand Equation
- 4) Calculate the optimum selling price and quantity for an organisation, equating marginal cost and marginal revenue
- 5) Evaluate a decision to increase production and sales levels,
- 6) Explain different price strategies
- 7) Calculate a price from a given strategy using cost-plus and relevant cost

1) Factors Effecting Pricing Decision

- 1) Organizational Goal
- 2) Price and demand relationship
- 3) Competitors
- 4) Cost
- 5) Product Mix
- 6) Quality
- 7) Inflation
- 8) Product Life Cycle

2) Price Elasticity Of Demand

Economic theory argues that the higher the price of a good, the lower will be the quantity demanded. The price elasticity of demand (PED) is a measure of the extent of change in demand for a good in response to a change in its price.

It is measured as:

$$\text{Price elasticity } (\eta) = \frac{\text{The change in quantity demanded, as a \% of demand}}{\text{The change in price, as a \% of the price}}$$

Since the demand goes up when the price falls, and goes down when the price rises, the elasticity has a negative value. However, it is usual to ignore the minus sign.

Example:

The price of a good is \$1.20 per unit and annual demand is 800,000 units. Market research indicates that an increase in price of 10 cents per unit will result in a fall in annual demand of 75,000 units. What is the price elasticity of demand between prices of \$1.20 and \$1.30 per unit?

Elastic and inelastic demand:

Demand is referred to as inelastic if the absolute value is less than 1 and elastic if the absolute value is greater than 1.

If a small change in price is accompanied by a large change in quantity demanded, the product is said to be elastic (or responsive to price changes). Conversely, a product is inelastic if a large change in price is accompanied by a small amount of change in quantity demanded.

Special values of price elasticity

- If the PED is greater than one, the good is price elastic. Demand is responsive to a change in price. If for example a 15% fall in price leads to a 30% increase in quantity demanded, the price elasticity = 2.0.
- If the PED is less than one, the good is inelastic. Demand is not very responsive to changes in price. If for example a 20% increase in price leads to a 5% fall in quantity demanded, the price elasticity = 0.25.
- If the PED is equal to one, the good has unit elasticity. The percentage change in quantity demanded is equal to the percentage change in price. Demand changes proportionately to a price change.
- If the PED is equal to zero, the good is perfectly inelastic. A change in price will have no influence on quantity demanded. The demand curve for such a product will be vertical.

3) Derive a Demand Equation

You need to be able to derive the demand equation

$$P = a - bQ$$

P = the price

Q = the quality demanded

a = the price at which demand would be nil

b = Change in Price / Change in quantity

The constant "a" is calculated as:

$$a = \$(\text{current price}) + \left\{ \frac{\text{current quantity}}{\text{change in quantity}} \right\} \times \text{change in price}$$

Example:

The current price of a product is \$12. At this price the company sells 60 items a month. One month the company decides to raise the price to \$15, but only 45 items are sold at this price. Determine the demand equation, which is assumed to be a straight line equation.

In order to maximize profit, the firm should set marginal revenue (MR) equal to the marginal cost (MC).

4) Maximizing profitability by equating MC - MR

Marginal revenue (**MR**) is the extra revenue that an additional unit of product will bring. It is the additional income from selling one more unit of a good. It can also be described as the change in total revenue divided by the change in the number of units sold.

It is very important to note that the gradient of **MR** function is twice the gradient of the demand function: -

$$MR = a - 2bQ$$

Marginal cost **MC** is the change in total cost that arises when the quantity produced changes by one unit. That is, it is the cost of producing one more unit of a good.

Example

A company is considering the price of a new product.

It has determined that the variable cost of making the item will be \$24 per unit.

Market research has indicated that if the selling price were to be \$60 per unit then the demand would be 1,000 units per week.

However, for every \$10 per unit increase in selling price, there would be a reduction in demand by 50 units and for every \$10 reduction in selling price, there would be an increase in demand of 50 units.

Calculate the optimal selling price.

Note: If Price $P = a - bx$ then Marginal Revenue $= a - 2bx$

5) Decision to increase production and sale volume

If you are required to evaluate a decision to increase production and sales levels, you will need to consider incremental costs, incremental revenues. If incremental revenue is greater than incremental costs then the extra units should produce.

Example:

George manufactures a product which uses two types of material, A and B. Each unit of production currently sells for \$10. A local trader has expressed an interest in buying 5,000 units but is only prepared to pay \$9 per unit.

Current costs and revenues are as follows

	\$'000	\$'000
Sales		350
Less production costs		
Material A – 1 kg per unit	25	
Material B – 1 litre per unit	50	
Labour – 1 hour per unit	75	
Variable overhead	50	
Fixed overhead	25	
Non-production costs	25	
Total cost	250	
Budgeted profit	100	

The following additional information has also been made available.

- There is minimal inventory of material available and prices for new material are expected to be 5% higher for Material A and 3% higher for Material B.
- George has been having problems with his workforce and is short of labour hours. He currently has the capacity to produce 36,000 units but would have to employ contract labour at \$3.50 per hour to make any additional units.
- Included in the fixed production overhead is the salary of the production manager. He is stressed and exhausted and has threatened to leave unless he receives a pay rise of \$5,000. George would not be able to fulfil any new orders without him.

Required

Evaluate whether George should accept the new order

Solution

Current production = $350,000 / 10 = 35,000$ units

Current cost per unit of Material A = $\$25,000 / 35,000 = \0.71

Current cost per unit of Material B = $\$50,000 / 35,000 = \1.43

Current cost of labour = $\$75,000 / 35,000 = \2.14

Incremental revenue (5,000 * \$9)		45,000
Incremental costs		
Material A (1.05 * \$0.71 * 5,000)	3,728	
Material B (1.03 * \$1.43 * 5,000)	7,365	
Labour [(1,000 * \$2.14) + (4,000 * \$3.50)]	16,140	
Fixed overhead	5,000	
Incremental profit		12,767

6) Pricing Strategies

Different price strategies, include;

- 1) Cost-plus pricing
- 2) Skimming
- 3) Penetration
- 4) Complementary product
- 5) Product-line
- 6) Volume discounting
- 7) Discrimination
- 8) Relevant cost

1) **COST PLUS PRICING:**

Cost-plus pricing involves establishing the unit cost and adding a mark-up or sales margin.

Full cost-plus pricing is a method of determining the sales price by calculating the full cost of the product and adding a percentage mark-up for profit

Advantages of full cost-plus pricing

- It is a quick, simple and cheap method of pricing which can be delegated to junior managers.
- Since the size of the profit margin can be varied, a decision based on a price in excess of full cost should ensure that a company working at normal capacity will cover all of its fixed costs and make a profit.

Disadvantages of full cost-plus pricing

- It fails to recognise that since demand may be determining price, there will be a profit maximising combination of price and demand.
- There may be a need to adjust prices to market and demand conditions.
- Budgeted output volume needs to be established. Output volume is a key factor in the overhead absorption rate.
- A suitable basis for overhead absorption must be selected, especially where a business produces more than one product.
- There is no attempt to establish optimum price.

2) **SKIMMING**

Essentially this strategy is used to achieve high unit profits in the early stages of a product's life cycle.

This is done by charging a high price on entry to the market and stimulating demand through advertising and promotion.

Customers are prepared to pay high prices in order to gain the perceived status of owning the product early.

This would enable the company to take advantage of the unique nature of the product, thus maximising sales from those customers who like to have the latest technology as early as possible.

The most suitable conditions for this strategy are:

- The product is new and different.
- The product has a short life cycle and high development costs that need to be recovered quickly
- High prices in the early stages of a product's life cycle are expected to generate high initial cash inflows. Since high prices attract competitors, there needs to be barriers to entry in order to deter competitors.
- The strength and sensitivity of demand are unknown.

As the product enters the later stages of its life cycle, the price will be reduced.

The approach essentially 'skims' the profit in the early stages of the life cycle before increased competition leads to lower prices.

One example of market skimming is digital cameras. When these were introduced, the initial selling price was high.

The manufacturers sought to build profit early in the product life cycle - and to recover the development costs over a relatively short period.

3) **PENETRATION PRICING;**

Market penetration is the term used to describe a policy in which the initial price is set at a lower level to build a strong market share, and is more likely to be successful when demand is elastic.

The price will make the product accessible to a larger number of buyers and therefore the high sales volumes will compensate for the lower prices being charged.

This allows economies of scale to be built rapidly so that unit costs can be reduced.

A penetration policy is used to discourage new entrants from entering the market.

It will shorten the initial period of a product's life cycle in order to enter the growth and maturity stages quickly.

4) **COMPLEMENTARY RPRODUCT**

A complementary product is one that is used in conjunction with another product.

For example, tennis balls and tennis rackets, razors and blades, printers and printer cartridges.

A complementary pricing strategy can take two forms:

The major product e.g. a printer is set at a relatively low price. Why? To encourage the consumer to purchase the low-value item and then he will be locked into subsequent purchases with higher prices eg. Cartridges.

5) **PRODUCT LINE PRICING**

A product line is a range of products that are intended to meet similar needs of different target audiences. The products within the product line are related but may vary in style, colour and quality.

Within the product mix or line, there are typically price points that reflect the price level: high, medium or low.

For example, most computer manufacturers have basic models, business models and premium high graphic and/or gaming models. Each of those model levels has its own price point. Automotive manufacturers have economy models, environmental models, luxury models, work models, and more.

6) **VOLUME DISCOUNTING**

Customers are offered a lower price per unit if they purchase a particular quantity of products.

There may be two types of discounts:

- Quantity discounts – for customers that order large quantities.
- Cumulative quantity discounts – the discount increases as the cumulative quantity ordered increases.

Volume discounting is applied to products with a limited shelf life, e.g. fashion items and also to clear unpopular items.

The discounts discourage the customers from trying out new suppliers as the cumulative quantity discounts 'lock in' the customer. Further purchases can be made at a lower cost per unit.

7) PRICE DISCRIMINATION

Price-discrimination occurs where a company sells the same products at different prices in different markets.

This is possible if:

- The seller can determine the selling price.
- Customers can be segregated into different markets.
- Customers cannot buy at the lower price in one market and then they sell at the higher price in the other market
- In each market, price elasticity of demand must be different: - in one market, prices can be increased and in the other market lowered so as to increase sales revenue.

8) RELEVANT COSTING

For short-term decisions, the incremental costs of accepting an order should be presented. Bids should then be made at prices that exceed incremental costs.

For short-term decisions many costs are likely to be fixed and irrelevant.

CHAPTER 10 SHORT-TERM DECISIONS

In this chapter, the following topics will be covered.

- 1) Relevant Costs
- 2) Make or Buy Decision
- 3) Outsourcing
- 4) Further Processing Decision
- 5) Shut Down Decision

1) Relevant Costs

Relevant costs are future cash flows arising as a direct consequence of a decision.

- Relevant costs are future costs
- Relevant costs are cash flows
- Relevant costs are incremental costs, arising as a direct consequence of the decision

Relevant cost includes;

- 1) Opportunity cost
- 2) Incremental cost
- 3) Variable cost
- 4) Avoidable cost

Non relevant cost includes;

- 1) Sunk cost
- 2) Committed cost
- 3) Fixed overhead absorbed
- 4) Depreciation (non cash item)

OPPORTUNITY COST

The benefit forgone by choosing one alternative in preference to the next best alternative.

AVOIDABLE COSTS

Costs attached to a part or segment of a business which could be avoided if that part or segment ceased to exist. Variable costs are normally considered avoidable, fixed costs normally not. Fixed costs may be considered avoidable if arise within the single part or segment of the business that is relevant. They are particularly applicable in shutdown decisions.

VARIABLE COST

Those costs which vary proportionately with the level of activity. As seen above the variable nature of the cost often makes it more likely to be relevant. We should already know that the variable cost is useful for break-even analysis or any other form of contribution analysis.

INCREMENTAL COST

Those additional costs (or revenues) which arise as a result of the decision. This classification is particularly useful for further processing decisions, but may be used as a basis for tackling any relevant cost analysis.

SUNK COST

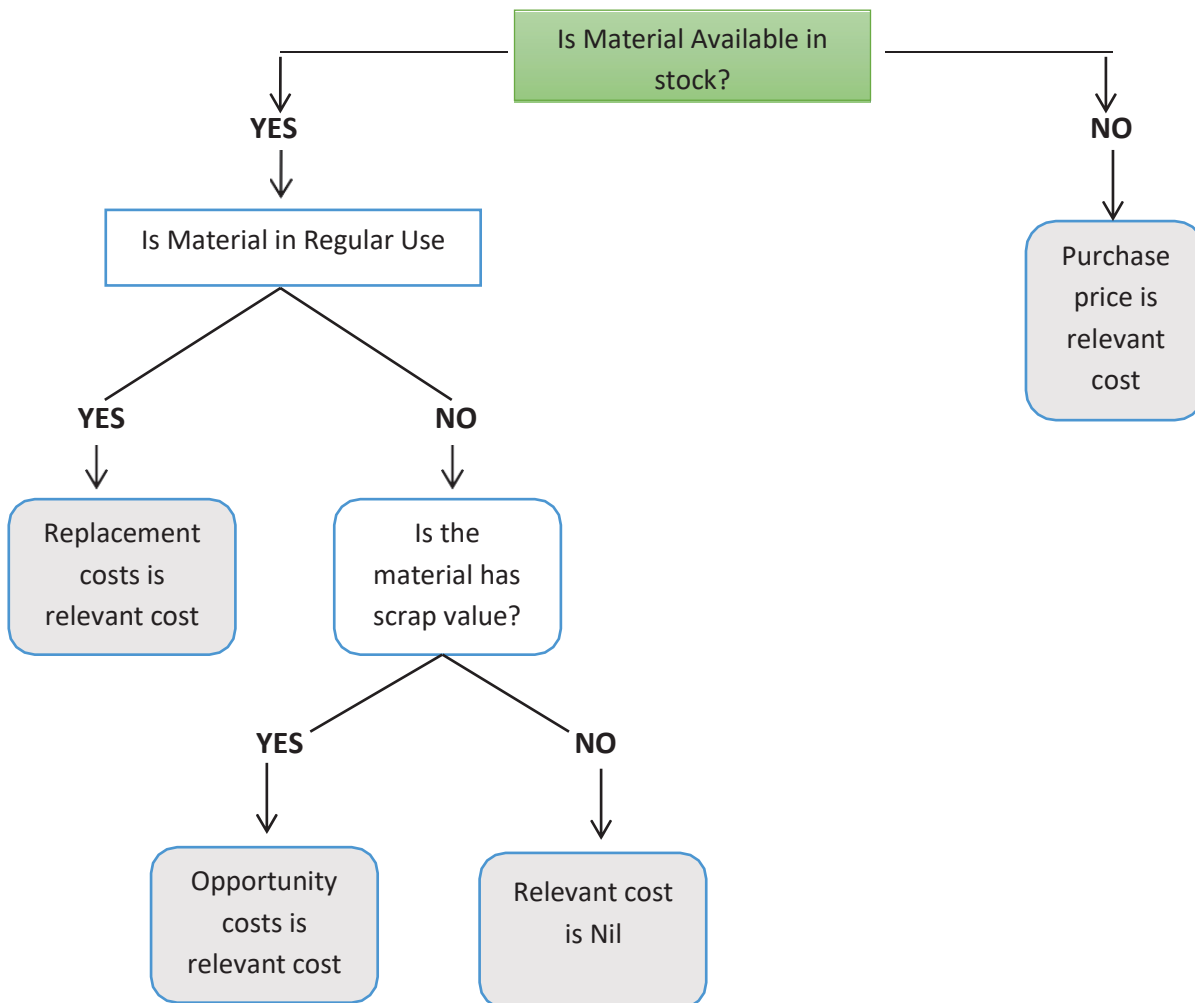
A cost that has already been incurred in past and thus cannot be recovered. E.g. rental cost.

COMMITTED COST

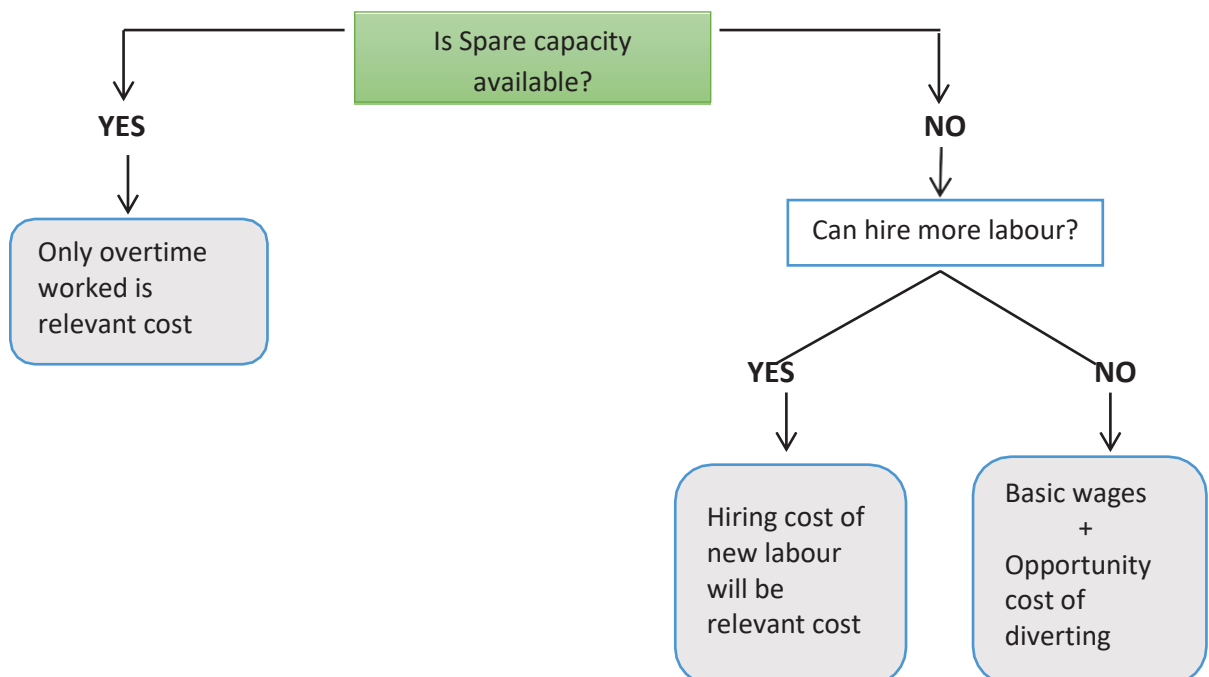
A committed cost is a cost that a business entity has already committed and cannot recover by any means, such as contractual obligations or legal obligation.

RELEVANT COSTING IN BUSINESS SCENARIO

MATERIAL



LABOUR



2) Make or buy decision

In a make or buy decision, the choice is between making items in-house or purchasing them from an external supplier. When there are no limiting factors restricting the in-house production capacity, the relevant costs are the differential costs between the two options.

If the total variable costs of internally manufactured components are seen to be greater than the cost of obtaining similar components elsewhere, it is obviously uneconomic to produce these items internally.

There are two types of make vs. buy decisions:

- Make or buy decisions with no limiting factors
- Make or buy decisions with limiting factors

Make or buy decisions with no limiting factors

In a make or buy decision, the choice is between making items in-house or purchasing them from an external supplier. When there are no limiting factors restricting the in-house production capacity, the relevant costs are the differential costs between the two options.

The relevant costs are the differential costs between making and buying, and they consist of differences in unit variable costs plus differences in directly attributable fixed costs. Sub- contracting will result in some fixed cost savings.

Format of relevant cost of make or buy decision:

Buying cost (purchasing price)	x
Less Variable cost of making	(x)
= Extra cost of buying/ (Saving)	x/(x)
Less fixed cost saved by buying	(x)
= Total extra cost of buying/(saving)	x

Example

Shellfish Co makes four components, W, X, Y and Z, for which costs in the forthcoming year are expected to be as follows.

	W	X	Y	Z
Production (units)	1000	2000	4000	3000
Direct material \$	4	5	2	4
Direct labour \$	8	9	4	6
Variable OHs	2	3	1	2

Directly attributable fixed costs per annum and committed fixed costs:

	\$
Incurred as a direct consequence of making W	1,000
Incurred as a direct consequence of making X	5,000
Incurred as a direct consequence of making Y	6,000
Incurred as a direct consequence of making Z	8,000

Directly attributable fixed costs are all items of cash expenditure that are incurred as a direct consequence of making the product in-house. A sub-contractor has offered to supply units of W, X, Y and Z for \$12, \$21, \$10 and \$14 respectively. Should Shellfish make or buy the components?

Make or buy decisions with a limiting factor;

A manufacturing organisation may want to produce items in-house but does not have sufficient capacity to produce everything that it needs, due to a limiting factor on production, such as a shortage of machine time or labour time.

Format of relevant cost of make or buying decision:

Buying cost or purchasing cost	x
Less Variable cost of making	(x)
= Extra cost of buying	x
÷ Scarce resource saved	x
= Extra cost of buying per scarce resource saved	x

Then ranked the product from that product which has high extra cost saved per scarce resource saved because that product should be making first to utilized the full capacity.

Example:

TW manufactures two products, the D and the E, using the same material for each. Annual demand for the D is 9,000 units, while demand for the E is 12,000 units. The variable production cost per unit of the D is \$10, that of the E \$15. The D requires 3.5 kgs of raw material per unit, the E requires 8 kgs of raw material per unit. Supply of raw material will be limited to 87,500 kgs during the year.

A sub-contractor has quoted prices of \$17 per unit for the D and \$25 per unit for the E to supply the product. How many of each product should TW manufacture in order to maximise profits?

Required

Fill in the blanks in the sentence below.

TW should manufacture Units of D and Units of E to maximise profit.

3) Outsourcing

Outsourcing means contracting out aspects of the work of the organisation, previously done in house, to specialist providers

Matters to be considered whilst outsourcing.

- Quality The quality of the outside producer must be acceptable
- Continuity of supply must be guaranteed
- Can the extra capacity freed up generate additional profits
- Will labour morale will be adversely affected?

Advantages of Outsourcing

- Lower investment risk
- Improved cash flow
- Concentrates on core activities
- Enable more advanced technologies to be used without making investments

Disadvantages of Outsourcing

- Possibilities of choosing wrong supplier
- Loss of control over process
- Possibilities of increasing lead time

4) Further processing decision

A further processing decision often involves joint products from a common manufacturing process. The decision is whether to sell the products at the split-off point, as soon as they emerge from the common process, or whether they should be processed further before selling them.

Joint products are two or more products which are output from the same processing operation, but which are indistinguishable from each other up to their point of separation.

- Joint products have substantial sale value while by-products have insignificant sale value.

- The point at which joint products become separately identifiable is known as the split-off point or separation point.
- Costs incurred prior to this point of separation are common or joint costs.

A joint product should be processed further past the split-off point if the **additional sales revenue exceeds the relevant post-separation** (further processing) costs.

Example:

The Poison Chemical Company produces two joint products, A and B from the same process. Joint processing costs of \$150,000 are incurred up to split-off point, when 100,000 units of A and 50,000 units of B are produced. The selling prices at split-off point are \$1.25 per unit for A and \$2.00 per unit for B. The units of A could be processed further to produce 60,000 units of a new chemical, A1, but at an extra fixed cost of \$20,000 and variable cost of 30c per unit of input. The selling price of A1 would be \$3.25 per unit. Should the company sell A or A1?

Solution

The only relevant costs/incomes are those which compare selling A against selling A1. Every other cost is irrelevant: they will be incurred regardless of what the decision is.

	A		A1
Selling price per unit	\$1.25		\$3.25
	\$		\$
Total sales	125,000		195,000
Incremental post-separation processing costs	–	Fixed	20,000
	–	Variable	30,000
Sales minus post-separation (further processing) costs	125,000		145,000
It is \$20,000 more profitable to convert A into A1			

5) Shutdown Decision

A shutdown decision is whether to close down an operation or stop making and selling a particular product or service.

Shutdown problems involve the following decisions.

- Whether or not to close down a product line, department or other activity, either because it is making losses or because it is too expensive to run
- If the decision is to shut down, whether the closure should be permanent or temporary

CHAPTER 11 RISK AND UNCERTAINTY

In this chapter, the following topics will be covered.

- 1) Risk and uncertainty
- 2) Market research and focus group
- 3) Probabilities and expected values
- 4) Decision rules
- 5) Decision trees
- 6) The value of information
- 7) Sensitivity analysis

1) Risk and Uncertainty

Risk refers to the situation where probabilities can be assigned to a range of expected outcomes arising from an investment project and the likelihood of each outcome occurring can therefore be quantified.

For e.g., based on past experience, a sales team may estimate it has a 60% chance of winning a particular contract.

Uncertainty refers to the situation where probabilities cannot be assigned to expected outcomes. Investment project risk therefore increases with increasing variability of returns, while uncertainty increases with increasing project life.

For e.g., it is very difficult to assign probabilities to a new product entering into a market

Risk Management is the process of understanding and managing the risks that the organisation will inevitably meet in attempting to achieve its objectives.

2) Market research and focus group

Management accounting directs its attention towards the future and the future is uncertain. For this reason a number of methods of taking uncertainty into consideration have evolved.

One approach to dealing with uncertainty is to obtain more information, in order to reduce the amount of uncertainty about what will happen. Reliable information reduces uncertainty.

Market research

Market research assesses and reduces uncertainty about the likely responses of customers to new products, new advertising campaigns, price changes, etc.

This can be **desk-based (secondary)** or **field-based (primary)**.

Desk-based research is cheap but can lack focus. It is collected from secondary sources, i.e. published and other available sources of information.

Field-based research is research by direct contact with a targeted group of potential customers. It is better than desk-based research in that you can target your customers and your product area.

Focus Groups

Focus groups are a form of market research. They are small groups (typically eight to ten individuals) selected from a broader population who are interviewed through discussions in an informal setting.

They are questioned in order to gather their opinions and reactions to a particular subject or marketing-orientated issues, known as test concepts

These focus groups can provide market researchers with much helpful information. However, it is difficult to measure the results objectively.

Their cost and logistical complexity is frequently cited as a barrier, especially for smaller companies. Focus groups have been used by banks to assess consumer reactions to new electronic banking products and by television companies to obtain voters' reactions to political elections.

Pay-off

Pay-off tables identify and record all possible outcomes (or pay-offs) in situations where there are two or more decision options and the outcome from each decision depends on the eventual circumstances that arise ('worst possible', 'most likely' or 'best possible').

A pay-off table is a table or matrix where:

- a) one side of the table has a different row (or column) for each decision option
- b) the other side of the table has a column (or row) for the eventual circumstances that may arise

The boxes in the middle of the table record the outcome given the decision option and the circumstances that arise.

Example;

A Co is trying to set the sales price for one of its products. Three prices are under consideration, and expected sales volumes and costs are as follows.

Pricing choices	Sales demand (units)	
\$4	Best possible	16,000
	Most likely	14,000
	Worst possible	10,000
\$4.30	Best possible	14,000
	Most likely	12,500
	Worst possible	8,000
\$4.40	Best possible	12,500
	Most likely	12,000
	Worst possible	6,000

Fixed costs are \$20,000 and variable costs of sales are \$2 per unit.

Prepare a pay-off table for the different possible outcomes for each decision opt?

Solution;

Here we need to prepare a pay-off table showing pay-offs (contribution) dependent on different levels of demand and different selling prices.

In the table below, there is a column for each of the three possible pricing options, and there is a row for each of the three possible outcomes: best possible, most likely and worst possible.

The table is completed by entering the total contribution (or it could be profit, if you prefer) for each different price, given each possible outcome. The workings are not shown here.

Pay-off table Price per unit	\$4	\$4.30	\$4.40
Contribution per unit	\$2	\$2.30	\$2.40
Total contribution towards fixed costs	\$	\$	\$
Best possible	32,000	32,200	30,000
Most likely	28,000	28,750	28,800
Worst possible	20,000	18,400	14,400

So how does a pay-off table help with reaching a decision?

- a) The highest contribution based on most likely sales volume would be at a price of \$4.40. However, it may be argued that \$4.30 would be a much better choice for price than \$4.40, since the most likely profit is almost as good, the worst possible profit is not as bad, and the best possible profit is better.
- b) However, given fixed costs of \$20,000, only a price of \$4 guarantees that the company would not make a loss, even if the worst possible outcome occurs. (The fixed costs of \$20,000 would just be covered.) A risk averse management might therefore prefer a price of \$4 to either of the other two prices.

3) Probabilities and expected values

PROBABILITY;

Probability is the measure of the likelihood that an event will occur. Probability is quantified as a number between 0 and 1 (where 0 indicates impossibility and 1 indicates certainty). The higher the probability of an event, the more certain we are that the event will occur.

A simple example is the toss of a fair (unbiased) coin. Since the two outcomes are equally probable, the probability of "heads" equals the probability of "tails", so the probability is 1/2 (or 50%) chance of either "heads" or "tails".

EXPECTED VALUE;

Where probabilities are assigned to different outcomes we can measure the weighted average value of the different possible outcomes. Each possible outcome is given a weighting equal to the probability that it will occur.

The expected value (EV) decision rule is that the decision option with the highest EV of benefit or the lowest EV of cost should be selected.

Example: Expected values

Suppose a manager has to choose between mutually exclusive options A and B, and the probable outcomes of each option are as follows.

Option A		Option B	
Probability	Profit	Probability	Profit
	\$		\$
0.8	5,000	0.1	(2,000)
0.2	6,000	0.2	5,000
		0.6	7,000
		0.1	8,000

The expected value (EV) of profit of each option would be measured as follows.

Option A				Option B			
Prob		Profit	EV of profit	Prob		Profit	EV of profit
0.8	x	\$5,000 =	\$4,000	0.1	x	\$(2,000) =	\$(200)
0.2	x	\$6,000 =	<u>\$1,200</u>	0.2	x	\$5,000 =	\$1,000
			\$5,200	0.6	x	\$7,000 =	\$4,200
				0.1	x	\$8,000 =	<u>\$8,00</u>
							\$5,800

In this example, since it offers a higher EV of profit, option B would be selected in preference to A

Limitations of expected values

Making a decision between different options on the basis of expected value has some significant limitations.

- 1) An expected value is a weighted average outcome that will occur in the long run if events occur many times over. It is a long run average.
- 2) The expected value of a decision may be a value that will never occur. For example, if there is a 0.7 probability of a profit of \$10,000 and a 0.3 probability of a loss of \$5,000, the expected value is $(0.7 \times \$10,000) - (0.3 \times \$5,000) = + \$5,500$. The EV is a profit of \$5,500, but this value cannot actually occur.
- 3) Because an EV is an average value, it ignores the extreme outcomes. For example, if there is a 0.7 probability of a profit of \$10,000 and a 0.3 probability of a loss of \$5,000, the expected value is a profit of \$5,500. However, if the organization cannot afford to incur a loss, making the decision on the basis of EV would be too risky.

4) Decision Rules

There are some other methods of decision which account for without probabilities and expected values. These are,

Maximin, maximax and minimax regret are three approaches to decision making under uncertainty.

MAXIMAX (BEST OF BEST)

The maximax rule involves selecting the alternative that maximises the maximum payoff available.

This approach would be suitable for an optimist, or 'risk-seeking' investor, who seeks to achieve the best results if the best happens. The manager who employs the maximax criterion is assuming that whatever action is taken, the best will happen; he/she is a risk-taker.

Assume the pay-off table shows the profit.

Scenarios	Project choice		
	D	E	F
i	100	80	60
ii	90	120	85
iii	(20)	10	85

Step 1

Select the best from all projects such as 100 from project D
120 from project E
85 from project F

Step 2

Select the best of the best, which is project E.

Criticisms of the maximax rule

- a) It ignores the probabilities of different outcomes.
- b) It ignores the outcomes that are less than the best possible. For some decision options, the worst possible may be more than the organization can afford. It is a decision rule for the risk-seeker.

MAXIMIN (BEST OF WORSTS)

The maximin rule involves selecting the alternative that maximizes the minimum pay-off achievable. The investor would look at the worst possible outcome at each supply level, then selects the highest one of these. The decision maker therefore chooses the outcome which is guaranteed to minimize his losses. In the process, he loses out on the opportunity of making big profits.

This approach would be appropriate for a pessimist who seeks to achieve the best results if the worst happens

Scenarios	Project Choice		
	D	E	F
i	100	80	60
ii	90	120	85
iii	(20)	10	85

Step 1

Select the worst from all projects such as (20) from project D.

10 from project E.

60 from project F.

Step 2

Select the best option from the above worst, which is project F.

Criticisms of the maximin rule

- It is defensive and conservative, being a safety first principle of avoiding the worst outcomes without taking into account opportunities for maximizing profits.
- It ignores the probability of each different outcome taking place

MINIMAX REGRET

The minimax regret strategy is the one that minimizes the maximum regret. It is useful for a risk-neutral decision maker. Essentially, this is the technique for a 'sore loser' who does not wish to make the wrong decision.

'Regret' in this context is defined as the opportunity loss through having made the wrong decision.

Regrets can be tabulated as follows

Assume the pay-off table shows profits.

Scenarios	Project Choice		
	D	E	F
i	100	80	60
ii	90	120	85
iii	(20)	10	85

Step 1

Find the best figure under each scenario which will have no regrets if achieved .100 in scenario (i)
120 in scenario (ii)
85 in scenario (iii)

Step 2

Find regret for each scenarios if the best does not happens.

Regret Table:

Scenarios	Project Choice		
	D	E	F
i	0	20	40
ii	30	0	35
iii	105	75	0

Step 4

Now select the maximum regret from all projects in each alternative. 105 in project D.
75 in project E.
40 in project F.

Step 5

Now select the minimum regret from the selected maximum regret, which is project F.

5) Decision Tree

A decision tree is a diagrammatic representation of a multi decision problem, where all possible courses of action are represented, and every possible outcome of each course of action is shown.

Decision trees should be used where a problem involves a series of decisions being made and several outcomes arise during the decision-making process. Decision trees force the decision maker to consider the logical sequence of events. A complex problem is broken down into smaller, easier to handle sections. For example, deciding whether to expand the business or not.

There are two main steps to making decisions using decision trees:

Step 1

Draw the tree from left to right, showing appropriate decisions and events / outcomes.

Step 2

Evaluate the tree from right to left carrying out these two actions:

- Calculate an EV at each outcome point.
- Choose the best option at each decision point.

A course of action is then recommended.

Example:

A Co has a new wonder product, the X, of which it expects great things. At the moment the company has two courses of action open to it, to test market the product or abandon it.

If the company test markets it, the cost will be \$100,000 and the market response could be positive or negative with probabilities of 0.60 and 0.40.

If the response is positive the company could either abandon the product or market it full scale.

If it markets the X full scale, the outcome might be low, medium or high demand, and the respective net gains (losses) would be (200), 200 or 1,000 in units of \$1,000. These outcomes have probabilities of 0.20, 0.50 and 0.30 respectively.

If the result of the test marketing is negative and the company goes ahead and markets the product, estimated losses would be \$600,000.

If, at any point, the company abandons the product, there would be a net gain of \$50,000 from the sale of scrap. All the financial values have been discounted to the present.

6) Value of information

When a decision-maker is faced with a series of uncertain events that might occur, he or she should consider the possibility of obtaining additional information about which event is likely to occur.

There are two types of information.

- 1) Perfect information
- 2) Imperfect information

Perfect information is available when a 100% accurate prediction can be made about the future. Perfect information removes all doubt and uncertainty from a decision, where probability is 100%. The value of perfect information is the maximum price that a company should pay for perfect information.

Imperfect information The forecast is usually correct, but can be incorrect. Imperfect information is not as valuable as perfect information. For example, predictions for future demand may only be 80% reliable.

7) Sensitivity Analysis

Hence, the value of imperfect information will always be less than the value of perfect information unless both are zero.

Sensitivity analysis is a method of analyzing the uncertainty in a situation or decision. It measures the effect of changes in the estimated value of an item ('key factor') on the future outcome.

By using this technique, it is possible to establish which estimates (variables) are more critical than others in affecting a decision.

Example;

A manager is considering a make vs buy decision based on the following estimates:

	If made in-house	If buy in and rebadge
	\$	\$
Variable production costs	10	2
External purchase costs		6
Ultimate selling price	15	14

You are required to assess the sensitivity of the decision to the external purchase price.

Solution

Step 1: What is the original decision?

Comparing contribution figures, the product should be bought in and rebadged:

	If made in house	If buy in and rebadge
	\$	\$
Contribution	5	6

Step 2: Calculate the sensitivity (to the external purchase price)

For indifference, the contribution from outsourcing needs to fall to \$5 per unit. Thus the external purchase price only needs to increase by \$1 per unit (or $\$1 / \$6 = 16.67\%$). If the external purchase price increase by more than 16.67% the original decision would be reversed

PART C

BUDGETING AND CONTROL

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CHAPTER 12 BUDGETARY SYSTEMS

We will cover the following topics in this chapter;

- 1) Objectives of budgetary systems
- 2) The planning and control cycle
- 3) Approaches to the budgeting
- 4) Information used in budget systems
- 5) Changing budgetary systems
- 6) Budget systems and uncertainty

1) Objectives of budgetary systems

A budget is a quantified plan of action for a forthcoming accounting period.

Here are the objectives of a budgetary planning and control system.

- Ensure the achievement of the organisation's objectives
- Compel planning
- Communicate ideas and plans
- Coordinate activities
- Provide a framework for responsibility accounting
- Establish a system of control
- Motivate employees to improve their performance

2) The planning and control cycle

The planning and control cycle has seven steps.

Step 1. Identify objectives

This requires the company to specify objectives towards which it is working. The objectives chosen must be quantified and have a timescale attached to them. Objectives should be SMART

- Specific
- Measurable
- Achievable
- Relevant
- Time limited

Step 2. Identify potential strategies

Once an organisation has decided 'where it wants to be', the next step is to identify a range of possible courses of action or strategies that might enable the organisation to get there.

Step 3. Evaluate strategies

The strategies must then be evaluated in terms of suitability, feasibility and acceptability. Management should select those strategies that have the greatest potential for achieving the organisation's objectives

Step 4. Choose alternative courses of action

The next step in the process is to collect the chosen strategies together and co-ordinate them into a long-term financial plan. Typically this would show the following.

- Projected cash flows
- Capital expenditure plans
- Projected long-term profits
- Balance sheet forecasts
- A description of the long-term objectives and strategies in words

Step 5. Implement the long-term plan

This stage shows the move from long-term planning to short-term plans – the annual budget. The budget provides the link between the strategic plans and their implementation in management decisions.

Step 6. Measure actual results and compare with the plan

Actual results are recorded and analysed and information about actual results is fed back to the management concerned, often in the form of accounting reports

Step 7. Respond to divergences from the plan

By comparing actual and planned results, management can then do one of two things, depending on how they see the situation.

- 1) They can take control action. By identifying what has gone wrong, and then finding out why, corrective measures can be taken.
- 2) They can decide to do nothing. This could be the decision when actual results are going better than planned

3) Planning and control

Planning and control occurs at all levels of the performance hierarchy to different degrees. The performance hierarchy refers to the system by which performance is measured and controlled at different levels of management within the organisation.

Performance hierarchy is of three types.

- 1) Strategic planning
- 2) Tactical planning
- 3) Operational planning



STRATEGIC PLANNING

Senior management formulate long-term (e.g. 5 to 10 years) objectives and plans for an organization. Such plans include overall profitability, the profitability of different segments of the business, capital equipment needs and so on.

TACTICAL PLANNING

Senior management make medium-term, more detailed plans for the next year, for e.g. decide how the resources of the business should be employed, and to monitor how they are being and have been employed.

An example would be: - how many people should be employed next year?

OPERATIONAL PLANNING

All managers are involved in making day-to-day decisions. 'Front-line' managers such as foremen or senior clerks have to ensure that specific tasks are planned and carried out properly within a factory or office. Operational information is derived almost entirely from internal sources. It is prepared frequently and is highly detailed. It is mainly quantitative.

If a manager achieves operational plans, it is more likely of meeting the tactical objectives and ultimately the strategic goals.

Control involves measuring actual results and comparing them against the original plan. Any deviation from plan requires control action to make the results conform with the plan.

4) Approaches to the budgeting

1. TOP DOWN BUDGETING

An imposed/top down budget is 'a budget allowance which is set without permitting the ultimate budget holder (operational level) to have the opportunity to participate in the budgeting process.

Advantages

- 1) Involving managers in the setting of budgets is more time consuming than if senior managers simply imposed the budgets.
- 2) Managers may not have the skills or motivation to participate usefully in the budgeting process.
- 3) Senior managers have the better overall view of the company and its resources and may be better placed to create a budget which utilizes those scarce resources to best effect.
- 4) Senior managers also are aware of the longer term strategic objectives of the organisation and can prepare a budget which is in line with that strategy.
- 5) Managers may build budgetary slack or bias into the budget in order to make the budget easy to achieve and themselves look good.

2. BOTTOM UP APPROACH

Participative/bottom up budgeting is 'A budgeting system in which all budget holders are given the opportunity to participate in setting their own budgets.

Advantages

- 1) The morale of the management is improved. Managers feel like their opinion is listened to, that their opinion is valuable.
- 2) Managers are more likely to accept the plans contained within the budget and strive to achieve the targets if they had some say in setting the budget, rather than if the budget was imposed upon them. Failure to achieve the target that they themselves set is seen as a personal failure as well as an organisational failure.
- 3) The lower level managers will have a more detailed knowledge of their particular part of the business than senior managers and thus will be able to produce more realistic budgets

3. **ROLLING BUDGET**

A rolling budget is sometimes called a continuous budget. Here, a portion of the budget period is replaced on a regular basis so that the overall budget period remains unchanged.

For example, with a budget period of one year, at the end of each quarter a new quarter could be added to the end of the budget period and the elapsed quarter could be deleted, so that the budget will always be looking one year ahead.

Advantages

- 1) They force managers to reassess the budget regularly, and to produce budgets which are up to date in the light of current events and expectations.
- 2) Planning and control will be based on a recent plan which is likely to be far more realistic than a fixed annual budget made many months ago.
- 3) Realistic budgets are likely to have a better motivational influence on managers.

4. **INCREMENTAL BUDGET**

Incremental budgeting is a process whereby this year's budget is set by reference to last year's actual results after an adjustment for inflation and other incremental factors.

Advantages

- 1) It is quick to do and a relatively simple process. This makes it possible for a person without any accounting training to build a budget.
- 2) The information is readily available, so very limited quantitative analysis is needed.

5. **ACTIVITY BASED BUDGET**

Activity-based budgeting (ABB) would need a detailed analysis of costs and cost drivers so as to determine which cost drivers and cost pools were to be used in the activity-based costing system.

However, whereas activity-based costing uses activity-based recovery rates to assign costs to cost objects, ABB begins with budgeted cost-objects and works back to the resources needed to achieve the budget.

The budgeted activity levels are determined in the same way as for conventional budgeting in that a sales budget and a production budget are drawn up.

Advantages

- 1) Organizational resources are allocated more efficiently due to the detailed cost and activity information obtained by implementing an ABB system
- 2) In ABB the costs of support activities are not seen as fixed costs to be increased by annual increments, but as depending to a large extent on the planned level of activity
- 3) It provides a useful basis for monitoring and controlling overhead costs, by drawing management attention to the actual costs of activities and comparing actual costs with what the activities were expected to cost.

6. **ZERO BASED BUDGET**

The principle behind zero based budgeting (ZBB) is that the budget for each cost Centre should be made from 'scratch' or zero. Every item of expenditure must be justified in its entirety in order to be included in the next year's budget.

The aim of zero based budgeting is to remove unnecessary and wasteful spending from the budget. It can be particularly useful in budgeting for administrative expenses and administrative departments, where there may be a tendency to tolerate unnecessary spending.

Implementing zero based budgeting;

There is a three-step approach to ZBB.

- 1) Define items or activities for which costs should be budgeted, and spending decisions should be planned: these are 'decision packages'
- 2) Evaluate and rank the packages in order of priority: eliminate packages whose costs exceed their value
- 3) Allocate resources to the decision packages according to their ranking. Where resources such as money are in short supply, they are allocated to the most valuable activities

Advantages

- 1) It eliminates the inefficiencies that can arise with incremental budgeting.
- 2) It focuses attention on the need to obtain value for money from the consumption of organizational resources.

7. **MASTER BUDGET**

The master budget is a summary of all of the budgets which generally comprises a budgeted income statement, a budgeted statement of financial position and a budgeted cash flow statement.

8. **FUNCTIONAL BUDGET**

Functional budgets are prepared and consolidated to produce the master budget. These would include raw materials budget, raw material usage and purchases budgets, sales budget and production budget.

9. **FIXED BUDGET**

A fixed budget is one prepared in advance of the relevant budget period which is not changed or amended as the budget period progresses.

This budget represents a periodic approach to budgeting, since a new budget is prepared towards the end of the budget period for the subsequent budget period. In this way, an organisation may set a new budget on an annual basis.

A fixed budget is likely to be useful in circumstances where the organizational environment is relatively stable and can be predicted with a reasonable degree of certainty.

10. **FLEXIBLE BUDGET**

A flexible budget is a budget which, by recognizing different cost behavior patterns, is designed to change as volumes of output change. This budget is always based on actual activity.

FEED-BACK AND FEED-FORWARD CONTROL

Feed-forward control is defined as the 'forecasting of differences between actual and planned outcomes and the implementation of actions before the event, to avoid such differences'.

Whereas feedback is based on a comparison of historical actual results with the budget for the period to date, feed-forward compares:

- the target or objectives for the period, and
- the actual results forecast.

BEYOND BUDGETING

Beyond Budgeting is a budgeting model which proposes that traditional budgeting should be abandoned. Adaptive management processes should be used rather than fixed annual budgets.

Criticism of budgeting

- 1) Budgets are time-consuming and expensive
- 2) Budgets provide poor value to users
- 3) Budgets fail to focus on shareholder value
- 4) Budgets are too rigid and prevent fast response
- 5) Budgets stifle product and strategy innovation
- 6) Budgets focus on sales targets rather than customer satisfaction

5) Information used in budget system

Information used in budgeting comes from a wide variety of sources.

Past data may be used as a starting point for the preparation of budgets but other information from a wide variety of sources will also be used.

The main sources of information for budgeting sale purposes are

- 1) Previous year's actual results.
- 2) Other internal sources which may include manager's knowledge.
- 3) Long-term requirements of individual customers, etc.
- 4) Estimates of costs of new products using work study techniques, technical estimates from research and development, etc.
- 5) Statistical techniques such as linear regression may help to forecast sales. EOQ may be used to forecast optimal inventory levels.
- 6) External sources of information may include suppliers' price lists, estimates of inflation and exchange rate movements, strategic analysis of the economic environment. Senior managers may incorporate assumptions concerning competitor actions based on the analysis of the market.

Sources of information for the production budget will include:

- 1) Labour costs including idle time, overtime and standard output rates per hour.
- 2) Raw material costs including allowances for losses during production.
- 3) Machine hours including expected idle time and expected output rates per machine hour.

6) Change in budgeting system

An organization wishing to change its budgetary practices will face a number of difficulties

The business environment has become increasingly complex, uncertain and dynamic and organization's need to be able to adapt quickly to changing conditions. It has been argued that traditional budgets are too rigid and prevent fast response to changing conditions.

However, an organization which decides to change its type of budget used, or budgetary system, will face a number of difficulties.

- 1) Resistance by employees. Employees will be familiar with the current system and may have built in slack so will not easily accept new targets. New control systems that threaten to alter existing power relationships may be thwarted by those affected.
- 2) Loss of control. Senior management may take time to adapt to the new system and understand the implications of results.
- 3) Training. In order for the new budget to operate effectively, everyone within the organization will

need to be fully trained. This is time-consuming and expensive.

- 4) Costs of implementation. Any new system or process requires careful implementation which will have cost implications.
- 5) Lack of accounting information. The organization may not have the systems in place to obtain and analyses the necessary information.

7) Budgeting system and uncertainty

In the budgeting process, there may be uncertainty at various levels.

- 1) Customers. They may decide to buy less than forecast, or they may buy more.
- 2) Products/services. In the modern business environment, organization's need to respond to customers' rapidly changing requirements.
- 3) Inflation and movements in interest and exchange rates.
- 4) Volatility in the cost of materials.
- 5) Competitors. They may steal some of an organization's expected customers, or some competitors' customers may change their buying allegiance.
- 6) Employees. They may not work as hard as was hoped, or they may work harder.
- 7) Machines. They may break down unexpectedly.
- 8) There may be political unrest (terrorist activity), social unrest (public transport strikes) or minor or major natural disasters (storms, floods).

CHAPTER 13

QUANTITATIVE ANALYSIS IN BUDGETING

In this we will cover the following topics;

- 1) High low method
- 2) Learning curves
- 3) Using spreadsheet in budgeting

1) High low method

The high-low method is a quantitative technique for analysing total costs into their fixed cost and variable cost elements.

Step 1

Variable cost per unit = $\frac{\text{High cost} - \text{Low cost}}{\text{High activity} - \text{Low activity}}$

Step 2

Total variable cost = variable cost per unit * High activity

Step 3

Total fixed cost = total variable cost

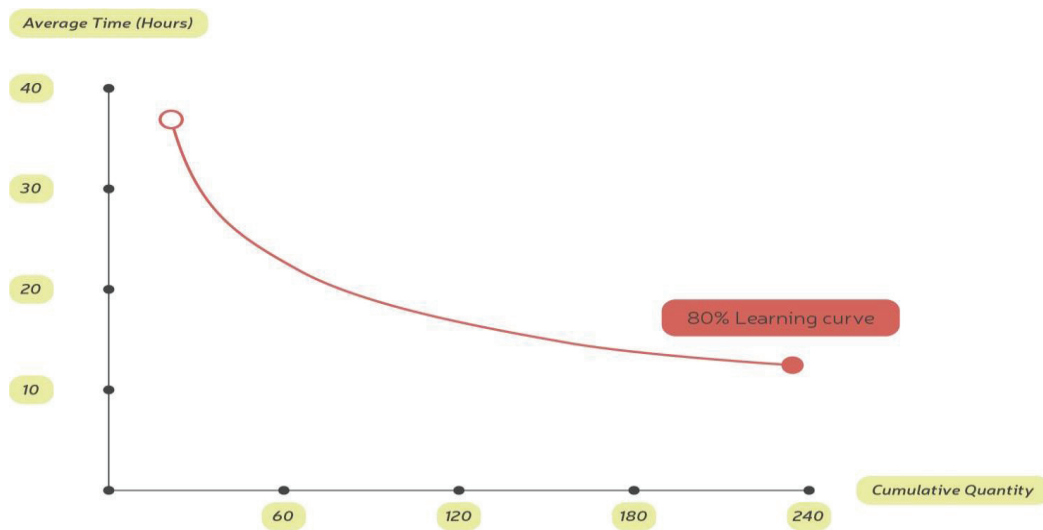
There are a number of problems with it.

- 1) The method ignores all cost information apart from costs at the highest and lowest volumes of activity and these may not be representative of costs at all levels of activity.
- 2) Inaccurate cost estimates may be produced as a result of the assumption of a constant relationship between costs and volume of activity.
- 3) Estimates are based on historical information and conditions may have changed

2) Learning curves

Learning Curve Theory is concerned with the idea that when a new job, process or activity commences for the first time, it is likely that the workforce involved will not achieve maximum efficiency immediately.

Repetition of the task is likely to make the people more confident and knowledgeable and will eventually result in a more efficient and rapid operation. Eventually the learning process will stop after continually repeating the job.



There are two methods that can be used to deal with a learning curve scenario. Be prepared to use either or both in the exam.

Method 1. The tabular approach

Method 2. The algebraic approach

METHOD 1; THE TABULAR APPROACH

The **tabular approach** can only be used to calculate average times when cumulative output doubles. A table can be used to calculate:

- the cumulative average time per unit, and
- the total time to produce all the units produced so far.

The rule to remember is that every time that cumulative output doubles, the average production time is $x\%$ of what is before, where x is the learning rate.

Example: The learning curve

Captain Kitts has designed a new type of sailing boat, for which the cost of the first boat to be produced has been estimated as follows:

Materials	5,000
Labour (800 hrs * \$5 per hr)	4,000
Overhead (150% of labour cost)	6,000
15,000	
Profit mark-up (20%)	3,000
Sales price	18,000

It is planned to sell all the yachts at full cost plus 20%. An 80% learning curve is expected to apply to the production work. The management accountant has been asked to provide cost information so that decisions can be made on what price to charge.

- What is the separate cost of a second yacht?
- What would be the cost per unit for a third and a fourth yacht, if they are ordered separately later on?
- If they were all ordered now, could Captain Kitts quote a single unit price for four yachts and eight yachts?

Solution

Cumulative number of units	Cumulative avge time per unit	Cumulative total time	Incremental number of units	Incremental total time	Incremental average time per unit
1	800.0	800.0	—	—	—
2*	640.0	1,280.0 **	1	480.0	480.0
4*	512.0	2,048.0	2	768.0	384.0
8*	409.6	3,276.8	4	1,228.8	307.2

* Output is being **doubled** each time.

** $640 \times 2 = 1,280$, $512 \times 4 = 2,048$

a) Separate cost of a second yacht

Materials	\$5,000
Labour (480 hrs * \$5)	\$2,400
Overhead (150% of labour cost)	\$3,600
Total cost	\$11,000

b) Cost of the third and fourth yachts

	\$
Materials cost for two yachts	10,000
Labour (768 hours * \$5)	3,840
Overhead (150% of labour cost)	5,760
Total cost	19,600
Cost per yacht (/2)	9,800

c) A price for the first four yachts together and for the first eight yachts together

	First four yachts \$		First eight yachts \$
Materials	20,000		40,000
Labour (2,048 hrs)	10,240	(3,276.8 hrs)	16,384
Overhead (150% of labour cost)	15,360		24,576
Total cost	45,600		80,960
Profit (20%)	9,120		16,192
Total sales price	54,720		97,152
Price per yacht (/4)	13,680	(/8)	12,144

METHOD 2; THE ALGEBRAIC APPROACH

The formula approach or algebraic approach is used to calculate the incremental time for any unit where a learning curve applies.

The formula for the learning curve is $Y = ax^b$

Y is the cumulative average time per unit to produce **x** units

x is the cumulative number of units

a is the time taken for the first unit of output

b is the index of learning ($\log LR / \log 2$)

LR is the learning rate as a decimal

The examiner has stated that you should not round 'b' to less than three decimal places. Ideally, you should keep the long number in your calculator and use that!

Example: Using the formula

Suppose that an 80% learning curve applies to production of a new product item ABC. To date (the end of June) 30 units of ABC have been produced. Budgeted production in July is 5 units. The time to make the very first unit of ABC in January was 120 hours. The labour cost is \$10 per hour.

Required

- Calculate the time required to make the 31st unit.
- Calculate the budgeted total labour cost for July.

Solution**a) Time to produce the first 30 units**

$$Y = ax^b$$

$$b = \log 0.8 / \log 2 = -0.09691 / 0.30103 = -0.3219281$$

$$Y = 120 \times (30 - 0.3219281) = 120 \times 0.3345594 = 40.147 \text{ hours}$$

$$\text{Total time for first 30 units} = 30 \times 40.147 \text{ hours} = 1,204.41 \text{ hours}$$

Time to produce the first 31 units

$$Y = 120 \times (31 - 0.3219281) = 120 \times 0.3310463 = 39.726 \text{ hours}$$

$$\text{Total time for first 31 units} = 31 \times 39.726 \text{ hours} = 1,231.51 \text{ hours}$$

$$(1,231.51 - 1,204.41) = 27.1 \text{ hours}$$

$$Y = 120 \times (35 - 0.3219281) = 120 \times 0.3183619 = 38.203 \text{ hours}$$

$$\text{Total time for first 35 units} = 35 \times 38.203 \text{ hours} = 1,337.11 \text{ hours}$$

b) Budgeted labour cost in July = (1,337.11 – 1,204.41) hours × \$10 per hour = \$1,327**Example**

A company needs to calculate a new standard cost for one of its products. When the product was first manufactured, the standard variable cost of the first unit was as follows.

Cost per unit

		\$
Direct material	10 kg @ \$4 per kg	40
Direct labour	10 hours @ \$9 per hour	90
Variable overhead	10 hours @ \$1 per hour	10
Total		140

During the following year, a 90% learning curve was observed in making the product. The cumulative production at the end of the third quarter was 50 units. After producing 50 units, the learning effect ended, and all subsequent units took the same time to make.

Required

What is the standard cost per unit for the fourth quarter assuming the learning curve had reached a steady state ie peak efficiency was reached after the 50th unit was produced?

Learning curve and steady state

The learning effect will only apply for a certain range of production.

For example, machine efficiency may restrict further improvements or there may be go slow arrangements in place.

Once the steady state is reached the direct labour hours will not reduce any further and this will become the basis on which the budget is produced.

Consequences of the learning curve theory

- 1) A standard costing system would need to set standard labour times after the learning curve had reached a plateau.
- 2) A budget will need to incorporate a learning cost factor until the plateau is reached.
- 3) A budgetary control system incorporating labour variances will have to make allowances for the anticipated time changes.
- 4) Identification of the learning curve will permit the company to better plan its marketing, work scheduling, recruitment and material acquisition activities.
- 5) The decline in labour costs will have to be considered when estimating the overhead apportionment rate.
- 6) As the employees gain experience they are more likely to reduce material wastage.

The learning curve theory limitations

- 1) The stable conditions necessary for the learning curve to take place may not be present – unplanned changes in production techniques or labour turnover will cause problems and affect the learning rate.
- 2) The employees need to be motivated, agree to the plan and keep to the learning schedule – these assumptions may not hold.
- 3) Accurate and appropriate learning curve data may be difficult to estimate.
- 4) Inaccuracy in estimating the initial labour requirement for the first unit.
- 5) Inaccuracy in estimating the output required before reaching a 'steady state' time rate.
- 6) It assumes a constant rate learning factor.

3) Using spreadsheet in budgeting

A spreadsheet is a type of general purpose software package with many business applications, not just accounting ones. It can be used to build a model, in which data is presented in these rows and columns, and it is up to the model builder to determine what data or information should be presented in it, how it should be presented and how the data should be manipulated by the spreadsheet program.

Spreadsheets provide a tool for calculating, analysing and manipulating numerical data. Spreadsheets make the calculation and manipulation of data easier and quicker.

Common applications of spreadsheets

Spreadsheets can be used for a wide range of tasks

- Management accounts
- Cash flow analysis and forecasting
- Reconciliations
- Revenue analysis and comparison
- Cost analysis and comparison
- Budgets and forecasts

Spreadsheets disadvantages if not properly used:

- 1) A minor error in the design of a model at any point can affect the validity of data throughout the spreadsheet. Such errors can be very difficult to trace.
- 2) Even if it is properly designed in the first place, it is very easy to corrupt a model by accidentally changing a cell or inputting data in the wrong place.
- 3) It is possible to become over-dependent on them, so that simple one-off tasks that can be done in seconds with a pen and paper are done on a spreadsheet instead.
- 4) The possibility for experimentation with data is so great that it is possible to lose sight of the original intention of the spreadsheet.
- 5) Spreadsheets cannot take account of qualitative factors since they are invariably difficult to quantify. Decisions should not be made on the basis of quantitative information alone.

CHAPTER NO 14 BUDGETING AND STANDARD COSTING

In this chapter, we will cover the following topics.

- 1) The use of standard costs
- 2) Deriving standards
- 3) Budgets and standard compared
- 4) Flexible budget
- 5) The principle of controllability

1) The use of standard costs

A standard cost is a predetermined estimated unit cost of a product or service such as direct material cost, direct labour cost and other overheads.

Standard costing has a variety of uses.

- It is useful for planning, control and motivation.
- It is used to value inventories and cost production for cost accounting purposes.
- It acts as a control device by establishing standards (planned costs), highlighting activities that are not conforming to plan and thus alerting management to areas which may be out of control and in need of corrective action.

2) Deriving standards

A standard cost is based on technical specifications for the materials, labour time and other resources required and the prices and rates for the materials and labour.

SETTING STANDARDS FOR MATERIALS COSTS

Direct materials costs per unit of raw material will be estimated by the purchasing department from their knowledge of the following.

- Purchase contracts already agreed
- Pricing discussions with regular suppliers
- The forecast movement of prices in the market
- The availability of bulk purchase discounts
- The quality of material required by the production departments

TYPES OF STANDARD

1) BASIC STANDARDS

These are long-term standards which remain unchanged over a period of years. Basic standards may become increasingly easy to achieve as time passes and hence, being undemanding, may have a negative impact on motivation. Standards that are easy to achieve will give employees little to aim at.

2) IDEAL STANDARDS

These standards are based upon perfect operating conditions. Therefore, they include no wastage, no scrap, no breakdowns, no stoppages, no idle time. Since perfect operating conditions are unlikely to occur for any significant period, ideal standards will be very demanding and are unlikely to be accepted as targets by the staff involved as they are unlikely to be achieved. Using ideal standards as targets is therefore likely to have a negative effect on employee motivation.

3) ATTAINABLE STANDARDS

These standards are based upon efficient but not perfect operating conditions. These standards include allowances for the fatigue, machine breakdown and normal material losses. Attainable

standards motivate performance as they can be achieved can be used for product costing, cost control, inventory valuation, estimating and as a basis for budgeting.

4) **CURRENT STANDARDS**

These standards are based on current level of efficiency and incorporate current levels of wastage, inefficiency and machine breakdown. They do not provide any incentive to improve on the current level of performance. Their impact on motivation will be a neutral one. Current standards are useful during periods of high inflation.

3) Budgets and standards compared

A budget is an overall plan and a standard cost is a unit cost. Standard costs may be used for budgeting. Budgets and standards are similar in the following ways.

- 1) They both involve looking to the future and forecasting what is likely to happen given a certain set of circumstances.
- 2) They are both used for control purposes. A budget aids control by setting financial targets or limits for a forthcoming period.

4) Flexible budget

A flexible budget is a budget which, by recognising different cost behaviour patterns, is designed to change as volume of activity changes.

A flexed budget is a budget prepared to show the revenues, costs and profits that should have been expected from the actual level of production and sales.

PREPARING A FLEXIBLE BUDGET

Step 1

The first step in the preparation of a flexible budget is the determination of cost behaviour patterns, which means deciding whether costs are fixed, variable or semi-variable.

Step 2

The second step in the preparation of a flexible budget is to calculate the budget cost per unit for each cost item.

Step 3

Now multiply the per unit data with the flexible budget units.

Step 4

Now compare the flexible budget with the actual data to calculate the variances.

The important advantages of flexible budget are as follows:

- A flexible budget enables the management to analyze the deviation of actual output from expected output.
- The management can compare actual costs at the actual volume with the budgeted costs at the actual volume.
- The flexible budget provides a correct basis for comparison between actual and expected costs for an actual activity.
- Flexible budget helps to fulfill the objectives of cost control as it shows where the actual performance deviated from the planned performance.

5) The principle of controllability

The principle of controllability is that managers of responsibility centres should only be held accountable for costs over which they have some influence.

BUDGET CENTRES

Budgetary control is based around a system of budget centres. Each budget centre will have its own budget and a manager will be responsible for managing the budget centre and ensuring that the budget is met.

The selection of budget centres in an organisation is therefore a key first step in setting up a control system.

A well-organised system of control should have the following features

- 1) A hierarchy of budget centres
- 2) Clearly identified responsibilities for achieving budget targets
- 3) Responsibilities for revenues, costs and capital employed

CHAPTER NO 15

VARIANCE ANALYSIS

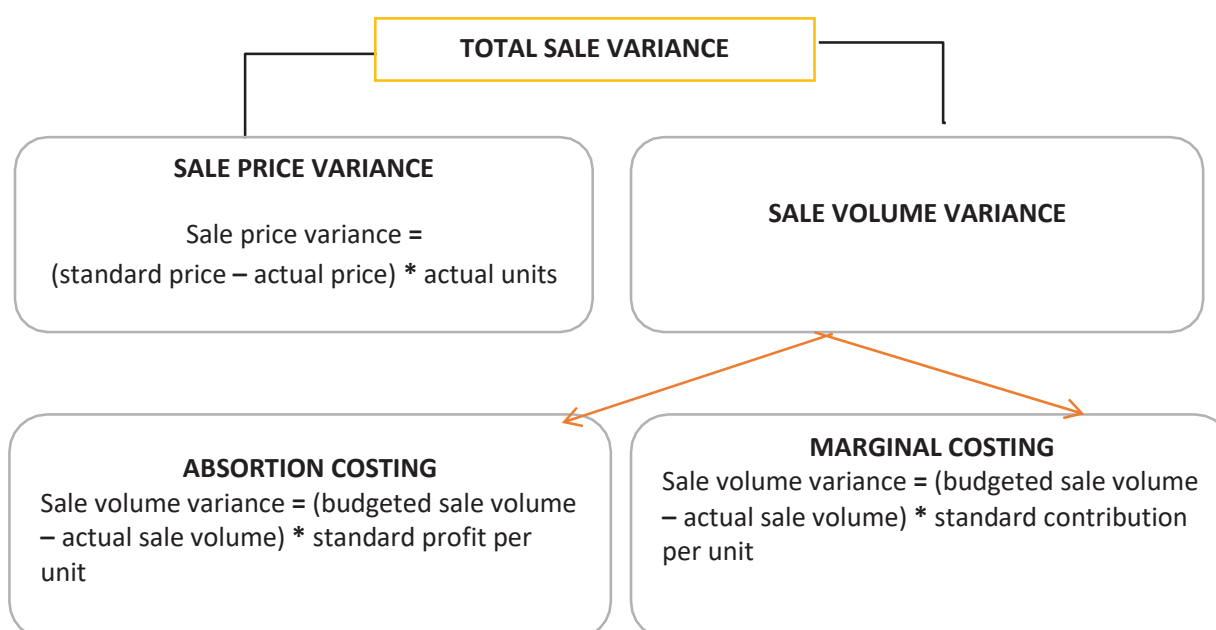
In this chapter, we will cover the following topics.

- 1) Basic variances
- 2) Operating statements
- 3) Investigating variances
- 4) Material yield and mix variances
- 5) Sale mix and quantity variances

1) Basic variances

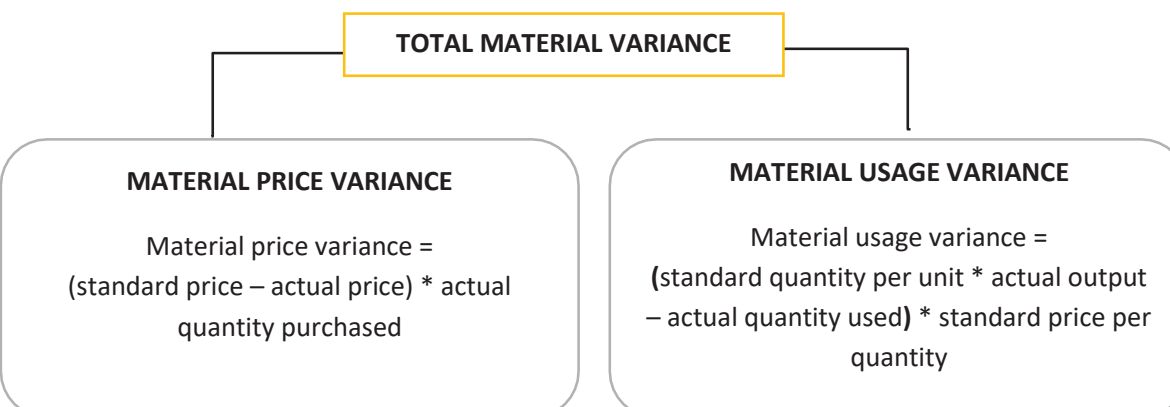
A variance is the difference between an actual result and an expected result. In standard costing, cost variances are the difference between the standard costs and actual costs of units produced.

The basic variances are as follow;



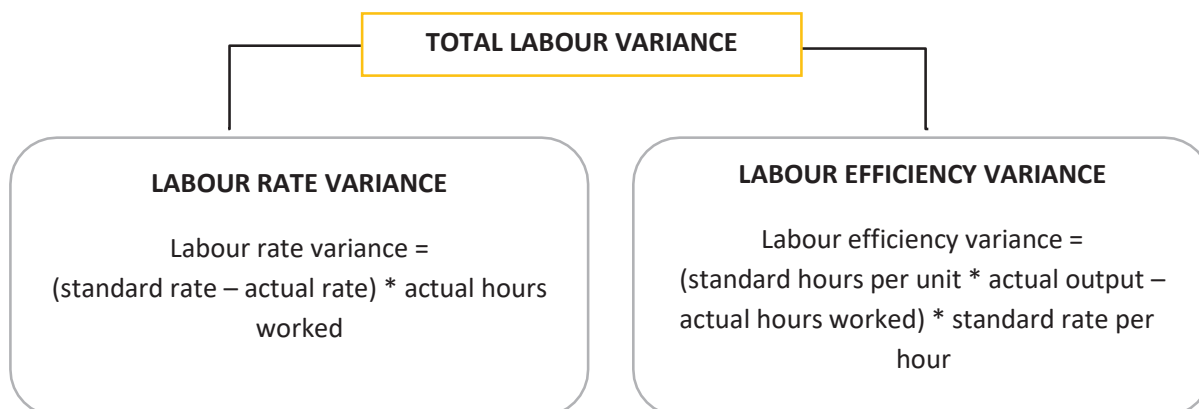
POSSIBLE CAUSES OF SALES VARIANCES

- unplanned price increases
- unplanned price reduction to attract additional business
- unexpected fall in demand due to recession
- increased demand due to reduced price
- failure to satisfy demand due to production difficulties



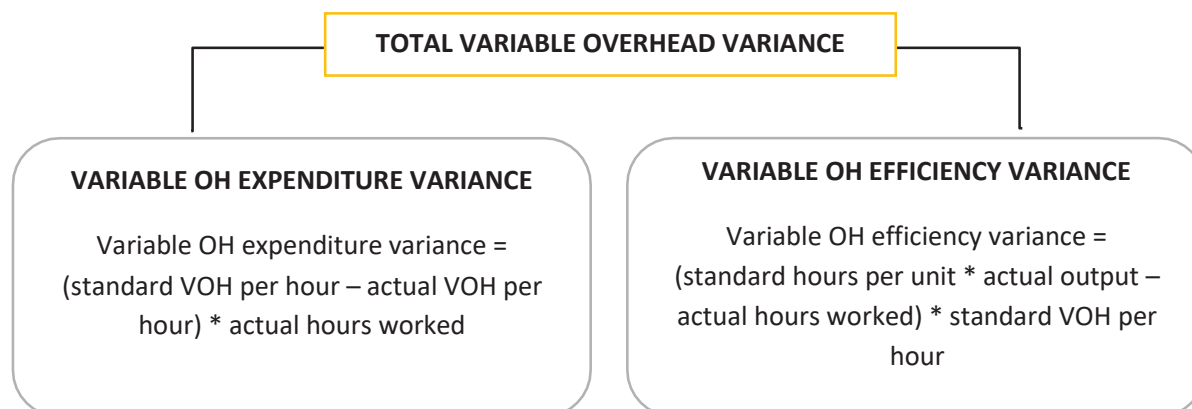
POSSIBLE CAUSES OF MATERIAL VARIANCES

- Unforeseen discounts received more care taken in purchasing change in material standard
- Price increase careless purchasing change in material standard
- Material used of higher quality than standard more effective use made of material errors in allocating material to jobs
- Defective material excessive waste theft stricter quality control errors in allocating material to jobs



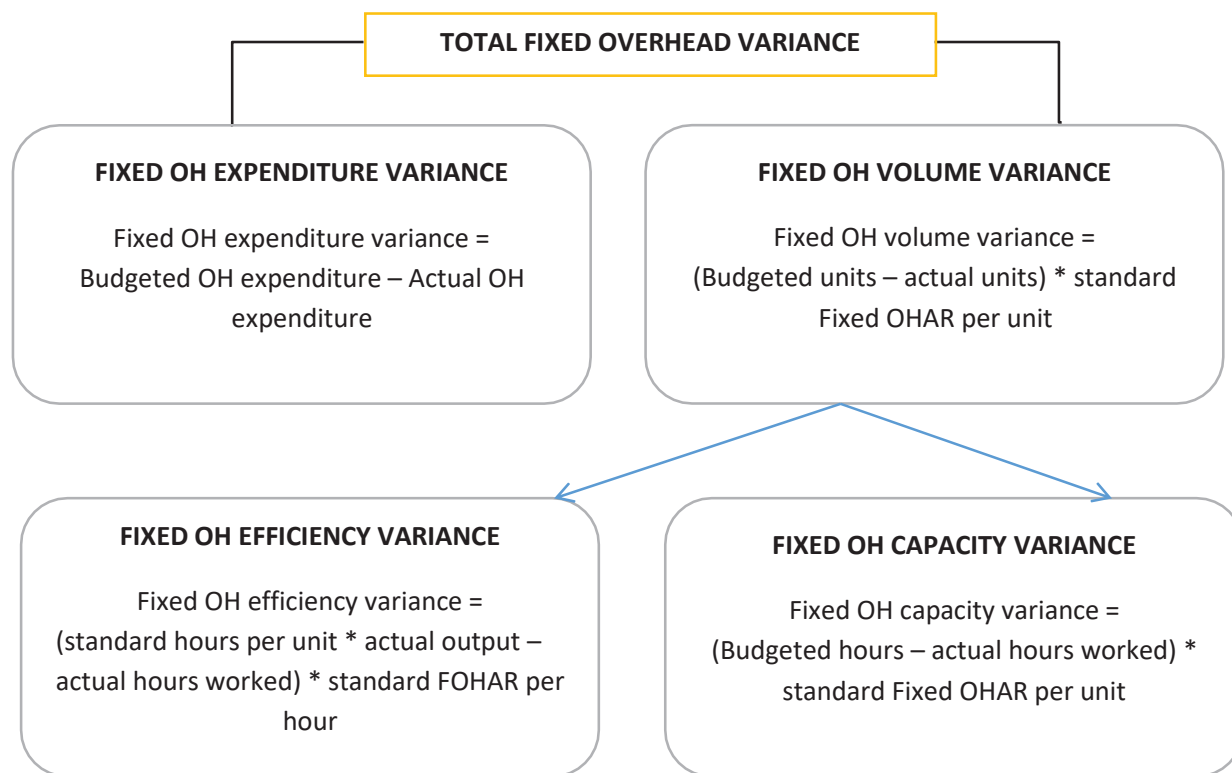
POSSIBLE CAUSES OF LABOUR VARIANCES

- wage rate increase use of higher grade labour
- the idle time variance is always adverse
- machine breakdown non-availability of material illness or injury to worker
- output produced more quickly than expected because of work motivation better quality of equipment or materials, or better methods. errors in allocating time to jobs



POSSIBLE CAUSES OF VARIABLE OVERHEAD VARIANCES

- Savings in costs incurred more economical use of overhead
- Increase in cost of overheads used excessive use of overheads
- Labour force working more efficiently (favourable labour efficiency) better supervision or staff training



POSSIBLE CAUSES OF FIXED OVERHEAD VARIANCES

- Savings in costs incurred changes in prices relating to fixed overhead expenditure
- Labour force working more efficientl
- Machine breakdown, strikes, labour shortage

2) Operating statements

OPERATING STATEMENTS IN MARGINAL COSTING

	Add Favorable	Less adverse	
Budgeted profit			X
Add; Budgeted fixed production costs			X
= Budgeted contribution			X
Adjust; Sales volume variance	✓	✓	
= Standard contribution on actual output			X
Sales price variance	✓	✓	
			X
Adjust variable cost variances;			
Material price variance	✓	✓	
Material usage variance	✓	✓	
Labour rate variance	✓	✓	
Labour efficiency variance	✓	✓	
Variable overhead expenditure variance	✓	✓	
Variable overhead efficiency variance	✓	✓	
	x	x	x/(x)
= Actual contribution			X
Adjust; Fixed expenditure variance	✓	✓	
Fixed volume variance	✓	✓	
	x	x	x/(x)
= Actual profit			X

OPERATING STATEMENTS IN A ABSORTION COSTING

	Add Favorable	Less adverse	
Budgeted profit			X
Adjust; Sales volume variance	✓	✓	
= Standard profit on actual output			X
Sales price variance	✓	✓	
			X
Adjust variable cost variances;			
Material price variance	✓	✓	
Material usage variance	✓	✓	
Labour rate variance	✓	✓	
Labour efficiency variance	✓	✓	
Variable overhead expenditure variance	✓	✓	
Variable overhead efficiency variance	✓	✓	
Fixed expenditure variance	✓	✓	
Fixed volume variance	✓	✓	
	x	X	x/(x)
= Actual profit			X

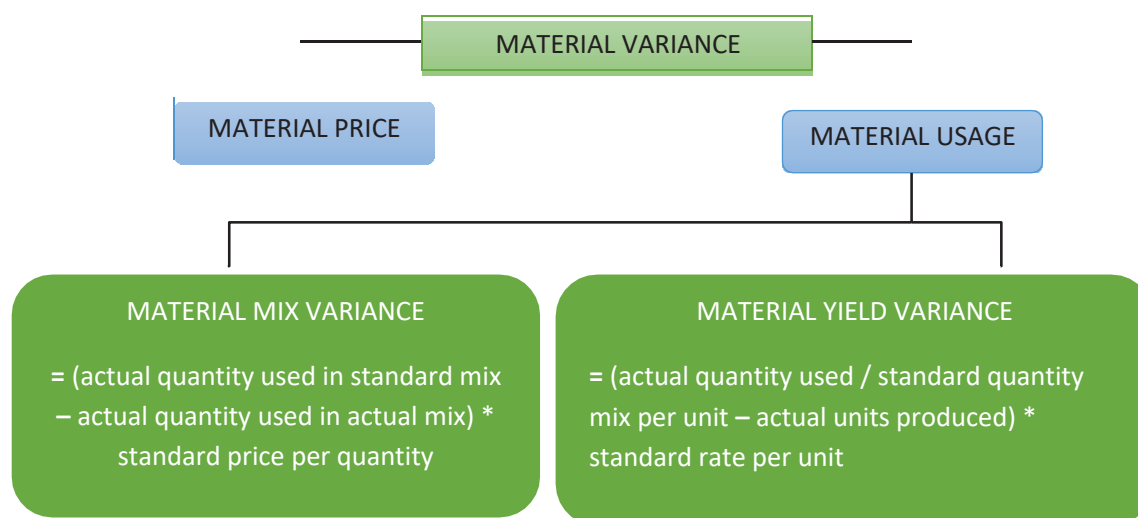
1) Investigating variance

When deciding which variances to investigate, the following factors should be considered:

- 1) Reliability and accuracy of the figures. Mistakes in calculating budget figures, or in recording actual costs and revenues, could lead to a variance being reported where no problem actually exists (the process is actually 'in control').
- 2) Materiality. The size of the variance may indicate the scale of the problem and the potential benefits arising from its correction.
- 3) Possible interdependencies of variances. Sometimes a variance in one area is related to a variance in another. For example, a favourable raw material price variance resulting from the purchase of a lower grade of material, may cause an adverse labour efficiency variance because the lower grade material is harder to work with. These two variances would need to be considered jointly before making an investigation decision.
- 4) The inherent variability of the cost or revenue. Some costs, by nature, are quite volatile (oil prices, for example) and variances would therefore not be surprising. Other costs, such as labour rates, are far more stable and even a small variance may indicate a problem.
- 5) Adverse or favourable? Adverse variances tend to attract most attention as they indicate problems. However, there is an argument for the investigation of favourable variances so that a business can learn from its successes.

- 6) Trends in variances. One adverse variance may be caused by a random event. A series of adverse variances usually indicates that a process is out of control.
- 7) Controllability/probability of correction. If a cost or revenue is outside the manager's control (such as the world market price of a raw material) then there is little point in investigating its cause.
- 8) Costs and benefits of correction. If the cost of correcting the problem is likely to be higher than the benefit, then there is little point in investigating further.

4) Material yield and mix variance



Example

A company manufactures a chemical, Dynamite, using two compounds Flash and Bang. The standard materials usage and cost of one unit of Dynamite are as follows.

	\$
Flash 5 kg at \$2 per kg	10
Bang 10 kg at \$3 per kg	30
	40

In a particular period, 80 units of Dynamite were produced from 600 kg of Flash and 750 kg of Bang.

Required

Calculate the materials usage, mix and yield variances.

Solution

USAGE VARIANCE

If we do not calculate a mix and yield variance, we would calculate a usage variance separately for each material

	Std usage for actual output of 80 units kg	Actual usage kg	Standard cost per kg \$	variance \$
Flash	5kg * 80 units = 400	600	2	400 A
Bang	10kg * 80 units = 800	750	3	150 F

The total usage variance of \$250 (A) can be analysed into a mix variance and a yield variance and these may be reported instead of the usage variance.

MIX VARIANCE

	Actual total usage In actual mix Kg	Actual total usage in standard mix kg	Standard price per kg \$	Mix variance \$
Flash	600	$1350/15 * 5 = 450$	2	300 A
Bang	750	$1350/15 * 10 = 900$	3	450 F

The total mix variance is \$150 (F).

YIELD VARIANCE

Yield variance = $(1350\text{kg} / 15\text{kg per unit} - 80 \text{ units}) * \40 per unit
= 400 adverse

The mix variance \$150 (F) plus the yield variance \$400 (A) together add up to the usage variance \$250 (A).

5) Sale mix and quantity variance

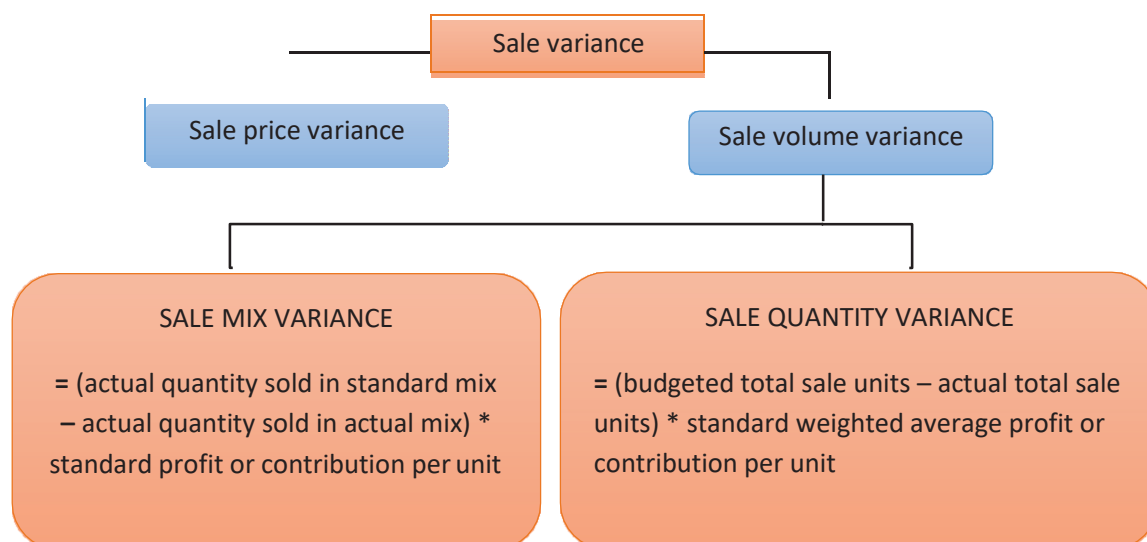
The sales mix variance occurs when the proportions of the various products sold are different from those in the budget.

The sales quantity variance shows the difference in contribution/profit because of a change in sales volume from the budgeted volume of sales.

A sales mix variance and a sales quantity variance are only meaningful where management can control the proportions of the products sold.

Situations where management may be able to control the sales mix are:

- where management can control the allocation of the advertising and sales promotion budget between different products
- where the same basic product is sold in different sizes or packaging, such as large size and small size.



Just Desserts Limited makes and sells two products, Chocolate Crunch and Strawberry Sundae. The budgeted sales and profit are as follows.

	Sale units	Sale revenue	Costs	Profit	Profit per unit
Chocolate Crunch (CC)	400	\$8,000	\$6,000	\$2,000	\$5
Strawberry Sundae (SS)	300	\$12,000	\$11,100	\$900	\$3

Actual sales were 280 units of Chocolate Crunch and 630 units of Strawberry Sundae. The company management is able to control the relative sales of each product through the allocation of sales effort, advertising and sales promotion expenses.

Required

Calculate the sales volume variance, the sales mix variance and the sales quantity variance.

Solution

(a) Sales volume variance

	CC	SS	
Budgeted sales	400 units	300 units	
Actual sales	280 units	630 units	
Sales volume variance in units	120 units (A)	330 units (F)	
X standard profit per unit	× \$5	× \$3	
Sales volume variance in \$	\$600 (A)	\$990 (F)	Total
sales volume variance	\$390 (F)		

SALE MIX VARIANCE

	Actual total sale In actual mix Units	Actual total sale in standard mix units	Standard profit per unit \$	Mix variance \$
CC	280	$910/7 * 4 = 520$	5	1,200 A
SS	630	$910/7 * 3 = 390$	3	720 F

The total mix variance is \$480 (A).

SALE QUANTITY VARIANCE

Sale quantity variance = (700 units – 910 units) * \$4.142 (\$2900/700 units) standard weighted average profit per unit = \$870 F

Sales mix variance \$480 (A) + Sales quantity variance \$870 (F) = Sales volume variance \$390 (F).

CHAPTER NO 16

PLANNING AND OPERATIONAL VARIANCES

This chapter includes the following topics.

- 1) Revising budget or standard cost
- 2) Planning and operational variances for sale market size and market share variances
- 3) Planning and operational variances for material
- 4) Planning and operational variances for labour
- 5) The value of Planning and operational variances

1) Revising budget or standard cost

A budget forms the basis of many performance management systems. Once set, it can be compared to the actual results of an organisation to assess performance. A change to the budget can be allowed in some circumstances but these must be carefully controlled.

Allow budget revisions when something has happened that is beyond the control of the organisation (for e.g. a supplier has gone into liquidation; a rapid increase in world market prices of a particular material) which renders the original budget inappropriate for use as a performance management tool. These adjustments should be approved by senior management who should attempt to take an objective and independent view.

Disallow budget revisions for operational issues. Any item that is within the operational control of an organisation should not be adjusted. This type of decision is often complicated and each case should be viewed on its merits. The direction of any variance (adverse or favorable) is not relevant in this decision.

2) Planning and operational variances for sale

A planning and operational approach to variance analysis divides the total variance into those variances which have arisen because of inaccurate planning or faulty standards (planning variances) and those variances which have been caused by adverse or favorable operational performance, compared with a standard which has been revised.

A planning variance (or revision variance) compares an original standard with a revised standard that should or would have been used if planners had known in advance what was going to happen.

A planning variance is deemed not controllable by management, i.e. management may not be held responsible.

$$\text{PLANNING VARIANCE} = \text{ORIGINAL BUDGET} - \text{REVISED BUDGET}$$

PLANNING VOLUME VARIANCE (market volume/size variance) =

(Original budgeted sale units – Revised budgeted sale units) x standard contribution per unit

An operational variance (or operating variance) compares an actual result with the revised standard. It is deemed controllable by management. Hence, management is held responsible for operational variances.

$$\text{OPERATIONAL VARIANCE} = \text{ACTUAL BUDGET} - \text{REVISED BUDGET}$$

OPERATIONAL VOLUME VARIANCE (market share variance) =

(Actual sale units Revised budgeted sale units) x standard contribution per unit

Example

Damsel budgeted to make and sell 400 units of its product, the Role, in the four-week period no 8, as follows.

Budgeted sales (100 units per week)	\$40,000
Variable costs (400 units @ \$60)	\$24,000
Contribution	\$16,000
Fixed costs	\$10,000
Profit	\$6,000

At the beginning of the second week, production came to a halt because inventories of raw materials ran out, and a new supply was not received until the beginning of week 3. As a consequence, the company lost one week's production and sales. Actual results in period 8 were as follows.

Sales (320 units)	\$32,000
Variable costs (320 units @ \$60)	\$19,200
Contribution	\$12,800
Fixed costs	\$10,000
Actual profit	\$2,800

In retrospect, it is decided that the optimum budget, given the loss of production facilities in the third week, would have been to sell only 300 units in the period.

Required

Calculate appropriate planning and operational variances for sales volume.

Solution

PLANNING SALE VOLUME VARIANCE

Original budgeted sales volume	400 units
Less Revised sales volume, given materials shortage	300 units
x standard contribution per unit	× \$40

= Sales volume planning variance **\$4,000 (A)**

Arguably, running out of raw materials is an operational error and so the loss of sales volume and contribution from the materials shortage is an opportunity cost that could have been avoided with better purchasing arrangements.

OPERATIONAL SALE VOLUME VARIANCE

Actual sales volume	320 units
Less Revised sales volume	300 units
x standard contribution per unit	× \$40

= Operational sales volume variance **\$800 (F)**

Operating statement,

Budgeted profit		\$6,000
Planning variance: sales volume	4,000 (A)	
Operational variance: sales volume	800 (F)	
		\$3,200 (A)
Actual profit		\$2,800

PLANNING SELLING PRICE VARIANCE

(Budgeted sale price per unit – revised sale price per unit) x actual units sold

OPERATIONAL SELLING PRICE VARIANCE

(Actual sale price per unit – revised sale price per unit) x actual units sold

1) Planning and operational variances for material

For materials planning and operational variances can be calculated by comparing original and revised budgets (planning) and revised budgets with actual results (operational).

A material price planning variance is really useful to provide feedback on just how skilled managers are in estimating future prices.

The operational variance is more meaningful as it measures the purchasing department's efficiency given the market conditions that prevailed at that time. It ignores factors which cannot be controlled by purchasing department.

MATERIAL PRICE PLANNING VARIANCE

(Original or Budgeted price per quantity – revised price per quantity) x actual quantity used

MATERIAL PRICE OPERATIONAL VARIANCE

(Actual price per quantity – revised price per quantity) x actual quantity used

MATERIAL USAGE PLANNING VARIANCE

[(standard quantity per unit – revised quantity per unit) x actual output] x standard price per quantity

MATERIAL USAGE OPERATIONAL VARIANCE

(Actual quantity used – revised quantity per unit x actual output) x standard price per quantity

4) Planning and operational variances for labour

LABOUR RATE PLANNING VARIANCE

(Original or Budgeted rate per hour – revised rate per hour) x actual hours worked

LABOUR RATE OPERATIONAL VARIANCE

(Actual rate per hour – revised rate per hour) x actual hours worked

LABOUR EFFICIENCY PLANNING VARIANCE

(Original or Budgeted hours per unit – revised hours per unit) x actual units produced x standard rate
per hour

LABOUR EFFICIENCY OPERATIONAL VARIANCE

(Actual hours per unit – revised hours per unit) x actual units produced x standard rate per hour

5) The value of Planning and operational variances

Advantages of a system of planning and operational variances

1) The analysis highlights those variances which are controllable and those which are non-controllable.

- 2) Managers' acceptance of the use of variances for performance measurement, and their motivation, is likely to increase if they know they will not be held responsible for poor planning and faulty standard setting.
- 3) setting.
- 4) The planning and standard-setting processes should improve; standards should be more accurate, relevant and appropriate.
- 5) Operational variances will provide a 'fairer' reflection of actual performance.

Limitations of planning and operational variances

- 1) What should a realistic / achievable standard be? This may be difficult to decide.
- 2) It may become too easy to justify all the variances as being due to bad planning, so no operational variances will be highlighted.
- 3) Revising and analysing variances into planning and operational will take time and can be costly.
- 4) Do managers use correctly this meaningful info? How can it improve their performance? Does it lead to better decision-making?

CHAPTER NO 17 PERFORMANCE ANALYSIS AND BEHAVIOURAL ASPECTS

The following topics are related to this chapter.

- 1) Analyse and evaluate past performance using the results of variance analysis
- 2) Behavioral implications
- 3) Setting the difficulty level for a budget
- 4) Participation in budgeting
- 5) Variances in a JIT or TQM environment
- 6) Standard costs in a rapidly changing environment

1) Analyse and evaluate past performance using of variance analysis

Variance analysis is used to analyse and evaluate past performance. It is also used for control purposes: significant variances may indicate that an aspect of performance is out of control and that measures should be taken to improve performance in the future.

Variance analysis compares actual performance with a budget or standard cost. Differences between actual results and the budget or standard are reported in monetary terms as variances, and variances can be used to reconcile budgeted profit and actual profit in an operating statement.

Basic principles of variance reporting are that:

- a) the money value that is given to variances should be a reasonable indication of how much profit has been made or lost as a result of actual performance differing from the budget or standard
- b) the managers responsible for variances (adverse or favorable) should be identified, and they should be expected to account for the variance and, where appropriate, indicate what corrective or control measures they are taking.

RESPONSIBILITY FOR PLANNING VARIANCES

Planning variances arise when a budget or standard cost is revised. 'Errors' in the budget or standard cost are attributable to the managers (planners) who prepared the budget or standard cost. Variances arising because the budget or standard cost was inappropriate should not be attributed to operational management.

Revisions to a budget or standard cost are due to

- 1) An unexpected increase in the market prices
- 2) an unexpected collapse in market demand for an industry's products

RESPONSIBILITY FOR OPERATIONAL VARIANCES

Responsibility for operational variances should be traced to the managers who are in a position of authority and control over operations where the variances occur

You should be able to identify the managers responsible for operational variances.

VARIANCE	RESPONSIBILITY
Sales price variance	Sales or marketing management
Sales volume variance	Normally sales or marketing management. However, if sales are less than budget due to problems with production, the production manager is responsible
Material price variance	The manager responsible for purchasing materials

Material usage variance	Normally the production manager
Labour rate variance	The manager responsible for pay rates. This may be senior management or Human Resources management. However, the production manager will be responsible for any adverse rate variances caused by working overtime and paying employees a premium rate per hour
Labour efficiency variance	Normally the production manager

USING VARIANCE ANALYSIS TO IMPROVE FUTURE PERFORMANCE

Variance	Possible control action
Adverse sales volume variance	Consider reducing the sales price in order to increase sales demand, although this will result in an adverse sale price variance
Adverse material price variance	Search for a supplier who is prepared to offer a lower price. Consider purchasing in bulk quantities in order to obtain large order discounts.
Adverse material usage variance Adverse labour efficiency variance	Consider providing training to the work force, with the objective of improving labour efficiency and reducing wastage of materials

2) Behavioral implication

The budgeting system has a number of behavioural problems can arise.

- 1) The managers who set the budget or standards are often not the managers who are then made responsible for achieving budget targets.
- 2) The goals of the organisation as a whole, as expressed in a budget, may not coincide with the personal aspirations of individual managers.
- 3) When setting the budget, there may be budgetary slack (or bias). Budget slack is a deliberate over-estimation of expenditure and/or under-estimation of revenues in the budgeting process. This results in meaningless variances and a budget which has no use for control purposes.

3) Setting the difficulty level for a budget

Budgets can motivate managers to achieve a high level of performance. But how difficult should budget targets or standard levels of efficiency be? And how might people react to targets of differing degrees of difficulty in achievement?

- There is likely to be a demotivating effect where an ideal standard of performance is set, because adverse efficiency variances will always be reported.
- A low standard of efficiency is also demotivating, because there is no sense of achievement in attaining the required standards. If the budgeted level of attainment is too 'loose', targets will be achieved easily, and there will be no impetus for employees to try harder to do better than this.

- A budgeted level of attainment could be the same as the level that has been achieved in the past. Arguably, this level will be too low. It might encourage budgetary slack

4) Participation in budgeting

Participation in the budgeting process will improve motivation and so will improve the quality of budget decisions and the efforts of individuals to achieve their budget targets.
A budget can be set from the top down (imposed budget) or from the bottom up (participatory budget).

IMPOSED STYLE OF BUDGETING (TOP-DOWN BUDGETING)

In this approach to budgeting, top management prepare a budget with little or no input from operating personnel which is then imposed upon the employees who have to work to the budgeted figures.
The times when imposed budgets are effective are as follows.

- In newly-formed organisations
- In very small businesses
- During periods of economic hardship
- When operational managers lack budgeting skills
- When the organisation's different units require precise coordination

PARTICIPATIVE STYLE OF BUDGETING (BOTTOM-UP BUDGETING)

In this approach to budgeting, budgets are developed by lower-level managers who then submit the budgets to their superiors. The budgets are based on the lower-level managers' perceptions of what is achievable and the associated necessary resources.

Participative budgets may be effective in the following circumstances.

- In well-established organisations
- In very large businesses
- During periods of economic affluence
- When operational managers have strong budgeting skills
- When the organisation's different units act autonomously

5) Variances in JIT and TQM environment

In a JIT manufacturing environment, production is managed on the principle that items should not be produced until they are required to meet sales orders. There should be no accumulation of inventories of work-in-progress and finished goods.

A JIT approach implies that if there are no sales orders, production resources should be kept idle.

Therefore in Just In Time (JIT) management,

- In JIT manufacturing, idle time should therefore be expected.
- In a system of standard costing, idle time is an adverse labour efficiency variance, and is undesirable.

TQM

- One aspect of TQM is the view that work should be 'right first time'. Mistakes that result in wastage and re-working of faulty output should be avoided
- Another aspect of TQM is similar to the JIT principle that items should be produced only when they are needed for the next stage in the production process, and finished goods should not be produced until they are needed for sales orders.
- A third aspect of TQM is the principle of continuous improvement or 'kaizen'. This is the view that the organisation should always look for small ways of improving performance standards, and

improvements should be made continually. The ideal level of performance will never be reached, because further improvements will always be possible.

Each of these principles of TQM may be inconsistent with standard costing and variance analysis.

- The philosophy in TQM of 'right first time' may be inconsistent with a standard cost that includes an allowance for wastage. TQM is more consistent with environmental cost accounting (material flow cost accounting) than a costing system that allows for normal loss in the standard cost.
- The principle of 'kaizen' or continuous improvement is that a steady state of production will never be achieved, because further improvements will always be possible. A standard cost is based on an assumption of a desirable steady state; and this view is inconsistent with the principle of continuous improvement.

6) Standard costing in a rapidly changing environment

Standard costs are appropriate for a 'steady state' production environment where the manufacturing system produces standard products, often in large quantities, using standard and repetitive production methods and processes.

In many industries today:

- Products are customised to the individual specifications of the customer. Although there may be a basic product, customers do not buy a standard product. Standard costing is more suitable for a mass production environment.
- In countries such as the UK, there are more service industries than manufacturing industries, and services are often non-standard in nature and the way they are delivered.
- Standard cost variances focus mainly on material cost and labour cost variances (and overhead variances may be a simple fixed cost expenditure variance). In many manufacturing companies, overhead costs are much more significant than labour costs. Variance reporting therefore fails to focus on the most important costs.
- Many of the variances in a standard costing system focus on the control of short-term variable costs. In most modern manufacturing environments, the majority of costs, including direct labour costs, tend to be fixed in the short run.
- In some industries products have a very short life cycle. In these circumstances, it may not be worthwhile developing a standard cost for new products. Instead costing techniques such as life cycle costing and target costing may be more appropriate for planning and control purposes.
- Variance reporting involves regular formal performance reports, typically every four weeks or month. Modern IT systems make it possible for operational managers to monitor performance much more frequently and 'on demand'. Variance reporting is not easily adapted to 'on demand' performance monitoring.

PART D

PERFORMANCE MEASUREMENT AND CONTROL

CHAPTERS	PAGE
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19. DIVISIONAL PERFORMANCE AND TRANSFER PRICING	89
20. FURTHER ASPECTS OF PERFORMANCE MANAGEMENT	93



CHAPTER 18 PERFORMANCE MEASUREMENT IN PRIVATE SECTOR ORGANISATION

The following topics will be covered in this chapter.

- 1) Performance measurement
- 2) Financial and non-financial performance indicators
- 3) Short-termism and manipulation
- 4) Improving performance
- 5) The balanced scorecard
- 6) Building block model

1) Performance measurement

Performance measures may be divided into two types.

- 1) Financial performance indicators
- 2) Non-financial performance indicators

FINANCIAL AND NON-FINANCIAL PERFORMANCE MEASURES

Measures of performance may be either financial or non-financial.

- Financial measures are typically measures relating to revenues, costs, profits, return on capital, asset values or cash flows. Actual performance is often measured against a financial plan, such as a budget.
- Non-financial measures may relate to a number of different aspects of performance, such as:
 - Product or service quality
 - Reliability
 - Speed of performance
 - Risk
 - Flexibility
 - Customer attitudes
 - Innovation
 - Capability
 - Pollution

Quantitative information is information that is expressed in numbers and by measurements. Qualitative information is not numerical, and may relate to issues such as customer loyalty, employee morale and capability. Qualitative information can sometimes be converted into quantitative values through tools such as ranking scales. For example, 1 = Good, 2 = Average, 3 = Poor.

- a) An example of a **quantitative** performance measure is: 1,000 units were produced in 50 hours at a cost of \$15 per unit
- b) An example of a **qualitative** performance measure is 'Market research indicates very strong and positive consume response to the new product.'

2) Financial Performance Indicators

A key aspect of performance measurement is ratio analyse

Firms can use ratio analysis to compare budgets, for control purposes last year's figures to identify trends competitors' results and/or industry averages to assess performance

MEASURING PROFITABILITY

- **Sales Growth** =
$$\frac{\text{Sales in current year} - \text{Sales in previous year}}{\text{Sales in previous year}}$$

In looking at sales growth, we usually consider other factors such as inflation. Hence, we analyse sales also in real terms.

- Return on Capital Employed** =
$$\frac{\text{Net Profit before interest and tax}}{\text{Capital Employed}} \times 100$$

The main ratio to measure profitability in an organization is return on capital employed (ROCE). Capital employed is defined as total assets less current liabilities or share capital and reserves plus long term capital. It represents the percentage of profit being earned on the total capital employed; and relates profit to capital invested in the business.

Capital invested in a corporate entity is only available at a cost – corporate bonds or loan stock finance generate interest payments and finance from shareholders requires either immediate payment of dividends or the expectation of higher dividends in the future.

- Asset Turnover** =
$$\frac{\text{Turnover}}{\text{Capital Employed}}$$

The asset turnover is a measure of utilisation and management efficiency. It indicates how well the assets of a business are being used to generate sales or how effectively management have utilised the total investment in generating income.

- Net Profit Margin** =
$$\frac{\text{Net Profit}}{\text{Turnover}} \times 100$$

The profit margin indicates how much of the total revenue remains to provide for taxation and to pay the providers of capital, both interest and dividends. This return to sales can be directly affected by the management's ability to control costs and determine the most profitable sales mix.

- Gross Profit Margin** =
$$\frac{\text{Gross Profit}}{\text{Turnover}} \times 100$$

MEASURING LIQUIDITY

Liquidity is the ability of an organization to pay its current liability when they fall due. There are two main measures of liquidity: -

1. the current ratio
2. the quick (or acid test) ratio
3. Current Ratio

- The current ratio** =
$$\frac{\text{Current assets}}{\text{Current Liabilities}}$$

If current assets exceed current liabilities, then the ratio will be greater than 1 and indicates that a business has sufficient current assets to cover demands from creditors. However, the speed at which stock can be converted into cash flow is such that it is not prudent to regard stock as available to cover creditors.

- **Quick (Acid Test) Ratio** =
$$\frac{\text{Current assets} - \text{Stocks}}{\text{Current Liabilities}}$$

If this ratio is 1:1 or more, then clearly the company is unlikely to have liquidity problems. If the ratio is less than 1:1 we would need to analyse the structure of current liabilities, to those falling due immediately and those due at a later date.

MEASURES OF UTILISATION (MEASURES OF EFFICIENCY) INCLUDE:

- 1) Debtors collection period
- 2) Creditors payment period
- 3) Stock turnover or stock days

- **Debtors (receivables) collection period** =
$$\frac{\text{Debtors}}{\text{Sales}} \times 365 \text{ days}$$

This is an indicator of the effectiveness of the company's credit control systems and policy. The control of debtor days is an important element of working capital management.

- **Creditors (payables) period** =
$$\frac{\text{Creditors (trade)}}{\text{Purchases}} \times 365 \text{ days}$$

This ratio is an aid to assessing company liquidity, as an increase in creditor days is often a sign of inadequate working capital control.

- **Inventory holding period** =
$$\frac{\text{Inventory}}{\text{Cost of sales}} \times 365 \text{ days}$$

The holding period may increase because of: -

Build-up of inventory levels as a result of increased capacity following expansion of non-current assets.
Increasing inventory levels in response to increased demand for product.

- **Work-in-progress period** =
$$\frac{\text{Value of WIP}}{\text{Cost of Sales}} \times 365 \text{ days}$$

- **Finished goods period** =
$$\frac{\text{Value of Finished Goods}}{\text{Cost of Sales}} \times 365$$

This is a further measure of working capital management and relates to stock turnover. Controls need to be maintained so that liquidity is not sacrificed.

MEASURING RISK

Measurement of risk considers the financial risk incurred by borrowing.

- Financial Gearing** =
$$\frac{\text{Debt}}{\text{Equity}} \times 100\%$$

OR

$$\frac{\text{Debt}}{\text{Debt} + \text{Equity}} \times 100\%$$

If the firm has excessive debt, then the need to pay interest before dividends will increase the risks faced by shareholders if profits fall.

- Interest Cover** =
$$\frac{\text{Profit before interest and tax}}{\text{Interest paid}} = \text{Number of times}$$

This ratio represents the number of times that interest could be paid out of profit before interest and tax.

- Dividend Cover** =
$$\frac{\text{Earnings after tax and preference dividends}}{\text{Ordinary dividend}} = \text{Number of times}$$

This is an indication of dividend policy – whether profits tend to be distributed or reinvested.

- Operating Gearing** =
$$\frac{\text{Fixed Costs}}{\text{Total Costs}}$$

The higher the proportion of fixed costs, the higher the operating gearing. Companies with high operating gearing tend to have volatile operating profits. This is because fixed costs remain the same, no matter the volume of sales.

Thus, if sales increase, operating profit increases by a larger percentage. But if sales volume falls, operating profit falls by a larger percentage.

Generally, it is a high-risk policy to combine high financial gearing with high operating gearing. High operating gearing is common in many service industries where many operating costs are fixed.

NON FINANCIAL INDICATORS

In recent years, the trend in performance measurement has been towards a broader view of performance, covering both financial and non-financial indicators.

The most well-known of these approaches is the balanced scorecard proposed by Kaplan and Norton, which we will be describing later.

Areas to measure should relate to an organisation's critical success factors. Critical success factors (CSFs) are performance requirements which are fundamental to an organisation's success (for example innovation in a consumer electronics company) and can usually be identified from an organisation's mission statement, objectives and strategy.

Key performance indicators (KPIs) are measurements of achievement of the chosen critical success factors. Key performance indicators should be:

- Specific (i.e. measure profitability rather than 'financial performance', a term which could mean different things to different people)
- Measurable (i.e. be capable of having a measure placed upon it, for example, number of customer complaints rather than the 'level of customer satisfaction')
- Relevant, in that they measure achievement of a critical success factor.

The following table demonstrates critical success factors and key performance indicators.

Perspective	Critical success factor	Key performance indicators
financial success	shareholder wealth	dividend yield; % increase in share price
	cash flow	actual vs budget debtor days
customer satisfaction	exam success	college pass rate vs national average premier college status tutor grading by students
	flexibility	average number of course variants per subject (e.g. full-time, day release, evening)
process efficiency	resource utilisation	% room occupancy average class size average tutor teaching load (days)
growth	innovation products information technology	% of sales from < 1-year-old number of online enrolments

NFPIs may be measurements of the following aspects of performance.

- 1) Quality of production: wastage rates or percentage of rejects in production
- 2) Speed or efficiency, such as output per hour; average time taken per unit of activity
- 3) Delivery: average time between taking an order and delivery to the customer
- 4) Reliability: percentage of calls answered within a given target time; number of equipment failures or amount of 'down time'
- 5) Customer satisfaction: number of complaints
- 6) Innovation: number of new products developed and launched on to the market

3) Short-termism and manipulation

Short-termism is when there is a bias towards short-term rather than long-term performance.

Decisions which involve the sacrifice of longer-term objectives include the following.

- Postponing or abandoning capital expenditure projects, which would eventually contribute to growth and profits, in order to protect short term cash flow and profits?
- Cutting R&D expenditure to save operating costs, and so reducing the prospects for future product development.
- Reducing quality control, to save operating costs (but also adversely affecting reputation and goodwill).

- Reducing the level of customer service, to save operating costs (but sacrificing goodwill).
- Cutting training costs or recruitment (so the company might be faced with skills shortages).

Managers may also manipulate results, especially if rewards are linked to performance. This can be achieved by changing the timing of capital purchases, building up inventories and speeding up or delaying payments and receipts.

4) Improving performance

Performance is measured to assess how well or badly an organisation has performed over a given period of time. When performance is measured, the objectives should be to:

- identify aspects of performance that may be a cause for concern
- explain differences between actual performance and the plan or expectation, or deteriorating performance over time
- consider ways of taking control measures to improve performance.

Three steps which are helpful in improving performance of an organisation

1) Analyse performance

The purpose of analysing performance in this way is to identify whether there are any aspects of performance that are worse than the target or worse than the previous year, where there may be some cause for concern.

2) Identify reasons for unexpected performance or poor performance

To identify possible reasons for disappointing performance, you may need to apply your judgement and common sense to the facts in an examination 'case study'.

Aspect of performance	Possible reasons
Increase in rejection rates for faulty products	Using relatively inexperienced staff to do the work Using cheaper materials (to 'save money')
Increase in time between taking a customer order and delivering the product to the customer	Administrative delays in processing customer orders
Increase in frequency of machine breakdowns	Reduction on amount of routine maintenance work
Customer dissatisfaction with on-line sales service	Poor web site design
Longer average time to answer customer calls in a call centre	Reduction in number of call centre staff
Declining labour productivity	Failure to train staff Increase in complexity of the work Use of inexperienced staff

3) Improving performance

Having identified reasons for poor performance, whether financial or non-financial performance, the final step is to consider and implement methods of improving performance.

Aspect of performance	Possible reasons	Possible measures to improve performance
Increase in rejection rates for faulty products	Using relatively inexperienced staff to do the work Using cheaper materials (to 'save money')	Hire more experienced staff Provide training Switch back to better-quality materials
Increase in time between taking a customer order and delivering the product to the customer	Administrative delays in processing customer orders	Set a maximum time limit for processing orders and monitor performance continually
Increase in frequency of machine breakdowns	Reduction on amount of routine maintenance work	Increase routine maintenance of machines
Customer dissatisfaction with on-line sales service	Poor web site design	Re-design the web site. Hire web site design specialists if necessary
Longer average time to answer customer calls in a call centre	Reduction in number of call centre staff	Employ more staff
Declining labour productivity	Failure to train staff Increase in complexity of the work Use of inexperienced staff	Hire more experienced staff Provide training Give the most complex tasks to specialist staff

5) Balanced scorecard

The balanced scorecard approach to performance measurement focuses on four different perspectives of performance, and uses both financial and non-financial indicators to set performance targets and monitor performance.

The balanced scorecard focuses on four different perspectives, as follows.

Perspective	Basic question	Identifying performance targets
Customer	What do existing and new customers value from us?	Gives rise to targets that matter to customers: cost, quality, delivery, inspection, handling and so on.
Internal	What processes must we excel at to achieve our financial and customer objectives?	Aims to improve internal processes and decision making.
Innovation and learning	Can we continue to improve and create future value?	Considers the business's capacity to maintain its competitive position through the acquisition of new skills and the development of new products.
Financial	How do we create value for our shareholders?	Covers traditional measures such as growth, profitability and shareholder value but set through talking to the

	shareholder or shareholders direct.
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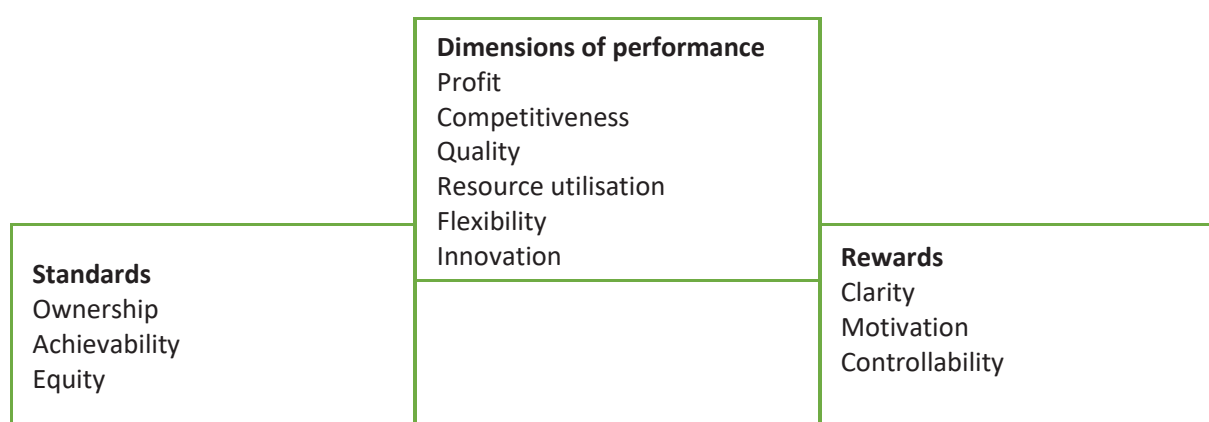
Important features of this approach are as follows.

- (a) It looks at both internal and external matters concerning the organisation.
- (b) It is related to the key elements of a company's strategy.
- (c) Financial and non-financial measures are linked together.

6) Building block model

Fitzgerald and Moon (1996) suggested that a performance management system in a service organisation can be analysed as a combination of three building blocks:

- Dimensions of performance
- Standards
- Rewards.



1) DIMENTION

Dimensions of performance are the aspects of performance that are measured.

Some performance measures that might be used for each of these dimensions are as follows.

Dimension of performance	Possible measure of performance
Financial performance	Profitability Profits growth Gross profit margin, net profit margin
Competitiveness	Growth in sales Retention rate for customers Success rate in converting enquiries into sales
Service quality	Number of complaints Customer satisfaction, as revealed by customer opinion surveys
Flexibility	Mix of different types of work done by employees Speed in responding to customer requests
Resource utilisation	Efficiency/productivity measures Capacity utilisation rates
Innovation	Number of new services offered within the previous year or two years

2) STANDARD

The second part of Fitzgerald and Moon's framework for performance measurement concerns setting the standards or targets of performance, once the measures for the dimensions of performance have been selected.

There are three aspects to setting standards of performance:

- Individuals need to feel that they 'own' the standards and targets for which they will be made responsible.
- Individuals also need to feel that the targets or standards are realistic and achievable.
- The standards and targets should be seen as 'fair' and equitable for all the managers in the organisation.

3) REWARD

The third aspect of Fitzgerald and Moon's performance measurement framework is rewards. This refers to the structure of the rewards system, and how individuals will be rewarded for the successful achievement of performance targets.

There are three aspects to consider in a reward system.

- The system of setting targets and rewarding individuals for achieving the targets should be clear. Clarity will improve the motivation to achieve the targets
- Achievement of performance targets should be suitably rewarded.
- Individuals should be made responsible only for aspects of performance that they are in a position to control.

CHAPTER NO 19 DIVISIONAL PERFORMANCE AND TRANSFER PRICING

The following topics will be covered in this chapter.

- 1) Divisionalisation
- 2) Return on investment (ROI)
- 3) Residual income (RI)
- 4) Transfer pricing

1) Divisionalisation

Divisionalisation is a term for the division of an organisation into divisions. Each divisional manager is responsible for the performance of the division. A division may be

- A cost centre (responsible for its costs only),
- A profit centre (responsible for revenues and profits) or
- An investment centre or Strategic Business Unit (responsible for costs, revenues and assets).

DECENTRALISATION

In general, a divisional structure will lead to decentralisation of the decision-making process and divisional managers may have the freedom to set selling prices, choose suppliers, make product mix and output decisions

ADVANTAGES OF DIVISIONALISATION

- 1) Divisionalisation can improve the quality of decisions made because divisional managers (those taking the decisions) know local conditions and are able to make more informed judgements
- 2) Decisions should be taken more quickly because information does not have to pass along the chain of command to and from top management
- 3) The authority to act to improve performance should motivate divisional managers
- 4) In a large business organisation, the central head office will not have the management resources or skills to direct operations closely enough itself. Some authority must be delegated to local operational managers.

DISADVANTAGES OF DIVISIONALISATION

- 1) Decisions might be taken by a divisional manager in the best interests of his own part of the business
- 2) Top management, by delegating decision making to divisional managers, may lose control since they are not aware of what is going on in the organisation as a whole.

RESPONSIBILITY ACCOUNTING

Responsibility accounting is the term used to describe decentralisation of authority, with the performance of the decentralised units measured in terms of accounting results.

With a system of responsibility accounting there are five types of responsibility centre: cost centre; revenue centre; profit centre; contribution centre; investment centre.

Type of responsibility centre	Manager has control over ...	Principal performance measures
Cost centre	Controllable costs	Variance analysis Efficiency measures
Revenue centre	Revenues only	Revenues
Profit centre	Controllable costs	Profit

	Sales prices (including transfer prices)	
Contribution centre	As for profit centre except that expenditure is reported on a marginal cost basis	Contribution
Investment centre	Controllable costs Sales prices (including transfer prices) Output volumes Investment in non-current assets and working capital	Return on investment Residual Income Other financial ratios

2) Return on investment (ROI)

The performance of an investment centre is usually monitored using either or both of return on investment (ROI) and residual income (RI).

$$\text{Return on investment (ROI)} = \frac{\text{Profit}}{\text{Capital employed}} \times 100$$

ROI AND NEW INVESTMENTS

If investment centre performance is judged by ROI, we should expect that the managers of investment centres will probably decide to undertake new capital investments only if these new investments are likely to increase the ROI of their centre

For example, if investment centre A currently has assets of \$1,000,000 and expects to earn a profit of \$400,000, how would the centre's manager view a new capital investment which would cost \$250,000 and yield a profit of \$75,000 pa?

	<i>Without the new investment</i>	<i>With the new investment</i>
Profit	\$400,000	\$475,000
Capital employed	\$1,000,000	\$1,250,000
ROI	40%	38%

3) Residual income (RI)

Residual income is a measure of the centre's profits after deducting a notional or imputed interest cost.

$$\text{RI} = \text{OPERATING PROFIT} - (\text{CAPITAL EMPLOYED} \times \text{INTEREST RATE})$$

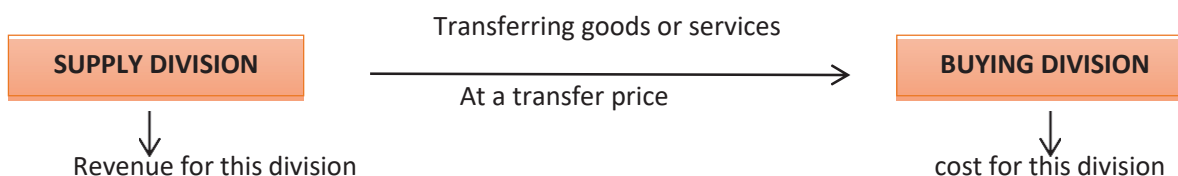
The advantages and weaknesses of RI compared with ROI
The advantages of using RI

- 1) Residual income will increase when investments earning above the cost of capital are undertaken and investments earning below the cost of capital are eliminated.
- 2) Residual income is more flexible since a different cost of capital can be applied to investments with different risk characteristics.

The weakness of RI is that it does not facilitate comparisons between investment centres nor does it relate the size of a centre's income to the size of the investment

4) Transfer pricing

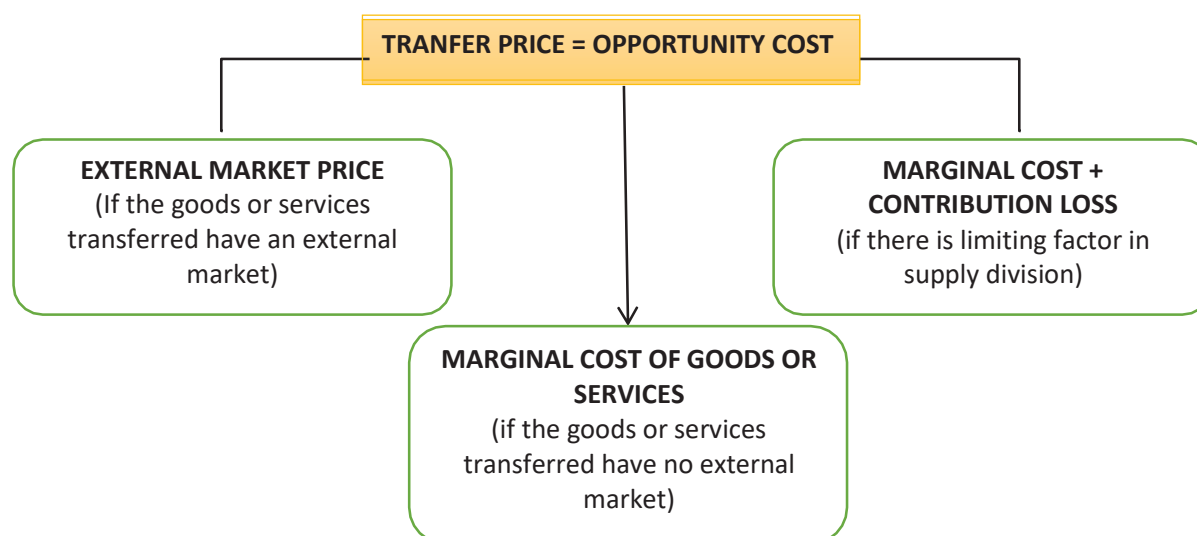
A transfer price is the price at which goods or services are transferred from one department to another, or from one member of a group to another.



Objectives of a transfer pricing system

- **Goal congruence**
The decisions made by each profit centre manager should be consistent with the objectives of the organisation as a whole, i.e. the transfer price should assist in maximising overall company profits. A common feature of exam questions is that a transfer price is set those results in suboptimal behavior
- **Performance measurement**
The buying and selling divisions will be treated as profit centres. The transfer price should allow the performance of each division to be assessed fairly. Divisional managers will be demotivated if this is not achieved

GENERAL RULES



Example: general rules

Division X produces product L at a marginal cost per unit of \$100. If a unit is transferred internally to division Y, \$25 contribution is foregone on an external sale. The item can be purchased externally for \$150.

- The minimum. Division X will not agree to a transfer price of less than $\$(100 + 25) = \125 per unit.
- The maximum. Division Y will not agree to a transfer price in excess of \$150.

The difference between the two results (\$25) represents the savings from producing internally as opposed to buying externally.

SETTING THE TRANSFER PRICE

There are two main methods available:

Method 1: Market based approach

If an external market exists for the transferred goods then the transfer price could be set at the external market price.

Method 2: Cost based approach

There are a number of different standard costs that could be used

- Marginal (variable) cost
- Full cost
- Full cost plus margin

PRICE	SUPPLYING DIVISION	BUYING DIVISION
Marginal (variable) cost	Fixed cost cannot be covered. Loss may occur	Full contribution earn
Full cost	All costs are covered. No profit, no loss	All profits are earned
Full cost plus margin	Make profit	May or may not make profit

ETHICAL ISSUES IN TRANSFER PRICING

There are a number of potential ethical issues for the multinational company to consider when formulating its transfer pricing strategy:

- Social responsibility, reducing amounts paid in customs duties and tax.
- Bypassing a country's financial regulation via remittance of dividends.
- Not operating as a 'responsible citizen' in foreign country.
- Reputational loss.
- Bad publicity.
- Tax evasion.

GOOD TRANSFER PRICE

A good transfer price should have the following characteristics (objectives):

1) Preserve divisional autonomy:

- Almost inevitably, divisionalisation is accompanied by a degree of decentralization in decision making so that specific managers and teams are put in charge of each division and must run it to the best of their ability.

2) Maintain motivation for managers

Be perceived as being fair for the purposes of performance evaluation and investment decisions.

3) Assess divisional performance objectively

Permit each division to make a profit: profits are motivating and allow divisional performance to be measured using positive ROI or positive RI

4) Ensure goal congruence

Encourage divisions to make decisions which maximize group profits: the transfer price will achieve this if the decisions which maximize divisional profit also happen to maximize group profit

CHAPTER NO 20**FURTHER ASPECT OF PERFORMANCE MANAGEMENT**

The following topics relate to this chapter.

- 1) Not for profit organisation
- 2) Performance measurement in not for profit organisations
- 3) External consideration

1) Not for profit organisation

A not for profit organization is a type of organization that does not earn profits for its owners. All of the money earned by or donated to a not for profit organization is used in pursuing the organization's objectives. Typically, not for profit organizations are charities or other types of public service organizations.

Objectives of Not-for-profit organisations

Not-for-profit organisations have multiple objectives which are difficult to define.

A major problem with many not-for-profit organisations, particularly government bodies, is that it is extremely difficult to define their objectives at all. In addition, they tend to have multiple objectives, so that even if they could all be clearly identified it is impossible to say which is the overriding objective.

2) Performance measurement in Not for profit organisation

Performance is judged in terms of inputs and outputs and hence the **value for money** criteria of economy, efficiency and effectiveness.

ECONOMY

Economy is concerned with the cost of inputs, and it is achieved by obtaining those inputs at the lowest acceptable cost. Economy does not mean straightforward cost-cutting, because resources must be acquired which are of a suitable quality to provide the service to the desired standard. Cost-cutting should not sacrifice quality to the extent that service standards fall to an unacceptable level. Economising by buying poor quality materials, labour or equipment is a 'false economy'.

EFFICIENCY

Efficiency means the following.

- (a) Maximising output for a given input, for example maximising the number of transactions handled per employee or per \$1 spent.
- (b) Achieving the minimum input for a given output. For example, a government department may be required to pay unemployment benefit to millions of people. Efficiency will be achieved by making these payments with the minimum labour and computer time.

EFFECTIVENESS

Effectiveness means ensuring that the outputs of a service or programme have the desired impacts; in other words, finding out whether they succeed in achieving objectives.

3) External consideration

Performance management needs to allow for external considerations including stakeholders, market conditions and allowance for competitors.

Stakeholders are groups of people or individuals who have a legitimate interest in the activities of an organisation. They include customers, employees, the community, shareholders, suppliers and lenders. There are three broad types of stakeholder in an organisation.

- Internal stakeholders (employees, management)
- Connected stakeholders (shareholders, customers, suppliers, financiers)
- External stakeholders (the community, government, pressure groups)

PERFORMANCE MEASURES

Organisations may need to develop performance measures to ensure that the needs of stakeholders are met.

Stakeholder	Measure
Employees	Morale index
Shareholders	Share price, dividend yield
Government	Percentage of products conforming to environmental regulations
Customers	Warranty cost, percentage of repeat customers



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